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PRODUCTION AND EFFICIENCY

THE INAUGURAL ADDRESS OF THE PRESIDENT, PROFESSOR A. L.
BOWLEY, C.B.E., Sc.D., F.B.A. DELIVERED TO THE ROYAL
STATISTICAL SOCIETY ON NOVEMBER 15TH, 1938.

WHEN it was my privilege to be elected a Fellow of this Society, on the nomination of Professor Alfred Marshall, in 1894, there were 933 Fellows, of whom I count 41 on the current list. During the 44 years that have elapsed 2433 Fellows have been elected and the Society has lost 2303, so that at the end of 1937 the Fellowship numbered 1063. In 1937 we lost 12 Fellows by death, of whom the two best known to statisticians, Mr. Gosset and Professor Daniels, are very specially regretted. This month we unhappily must add Mr. Alfred Hoare, sometime member of the Council and the contributor of a paper in 1925; and Mr. Dale of the Ministry of Labour, whose paper on unemployment will be remembered by many present.

The Fellowship reached its maximum in 1928 at 1079, fell to 1024 in 1933, and recovered to 1063 in 1937. I give these numbers in order to show that, unless more candidates are found from the large number of young and eager economists and statisticians that now exists, we have reached a stationary population and a stationary income. Unfortunately, with our new commitments for the Supplement and increased printing costs, our expenditure has increased, and in each of the last four years payments have exceeded receipts. The question that the Council has had to consider earnestly is how to reduce expenditure without sacrificing anything that is essential for furthering the objects of the Society. Since a great part of the expenses are fixed, and the Library is already starved except from accretions by gifts, the only field of economy is the *Journal*. To the majority of Fellows the *Journal* is the Society, for very many do not attend the meetings or use the Library. The very last thing that should be contemplated is the exclusion of matter that is of scientific value within our field, or that the Fellows find to be of use

to them. In a recent canvas it was found that no section of the *Journal's* contents could be sacrificed without inconvenience. But there is an alternative. If one looks through recent issues, it becomes clear that some papers are unnecessarily long, some parts of the discussion verbose, some of the mathematical analyses in want of compression, some tables redundant. I would seriously ask writers and speakers to read through their manuscripts before sending them to the Editors with a view to cutting out the irrelevant and aiming at conciseness in the essential. Voluntary rationing is preferable to compulsory, and it is hoped that the requests of the Council and Editors will meet with ready acquiescence. Let us aim at the efficiency in production that is the subject of my address this evening.

In choosing a subject for an address it is natural to consider the examples set by former Presidents. Usually they have given the valuable results of their recent work or some account of the activities of the Departments they have directed. I cannot follow these precedents. My excuse must be that I have been a Fellow of the Society for 44 years, which is a longer period than that of any of my predecessors, except Sir Rawson W. Rawson, who was an original member in 1835 and gave a Presidential Address on International Statistics in 1885. The result of this long period in my case is that I have already offered to the Society or otherwise published the work that I have done, and have recently summarized a great part of it. Thus I have nothing new or old to offer, and I propose instead to set problems to the Fellows, in the hope that they may result in worthy contributions at a later date, especially from the Industrial and Agricultural Research Section or the Study Group. Such statistics as I may give are to be regarded as illustrative and subject to all kinds of criticism and amplification, rather than as finished products. For I have never worked at all intensively on the subject of productivity; I do not know all the sources of information nor the definitions or limitations of the material.

My text is taken from Professor Leacock's *Discovery of the West*. He writes that the *Journal Technocracy* showed that our enormous increase in machine-power gives us the means to satisfy and oversatisfy our wants. This idea is not new. Bellamy's *Looking Backward* and Morris's *News from Nowhere* were published some 50 and 43 years ago, and there, and, I daresay, in earlier works, it was assumed or alleged that man's command over the resources of Nature is so great that all that is wanted can be produced without serious effort in a short working day, of which the minimum is put at perhaps four hours. So deeply has this idea penetrated, that the French last year reduced their working week to 40 hours in five days, without waiting for the necessary adjustments of production to take

place. Also increased productivity is often alleged to have given rise to "technological" unemployment.

There has, I think, been no serious and general examination of the data on which these aspirations are based, and it is to this that I invite the co-operation of Fellows. Such an examination must relate a definite standard of living to a given aggregate effort, after any reorganization of production and distribution that may be regarded as desirable has taken place. The Russian experiment will no doubt throw some light on the problem, but otherwise it remains in the realm of theory. I thought that it would be interesting to consider some aspects of the question in a preliminary way.

Improvement depends on greater efficiency in producing goods and in rendering services. Efficiency is measured in physics by the ratio of the energy rendered available to the energy expended, a precise way of stating its familiar meaning. Put in other words, the less effort is wasted, the greater the efficiency. In dealing with the economy of a society, the effort to be measured is the aggregate put forth by all its members, the result is the provision of all those goods and services that are held to be desirable.

In a general survey we may put aside any idea that there is so large a body of idle rich that their absorption into industry would sensibly lighten the burden of existing workers. We cannot so easily neglect the existence of the unemployed workers, but we could if necessary make some estimate of their potential contribution to production. Perhaps we could say that the additional output due to their employment would be comparable to the difference in production between the height of a boom and the depth of a depression, which is by no means negligible. It is not, however, necessary to discuss any problems of unemployment for my present purpose.

Let us take for the purpose of argument that full employment under the existing organization of industry would yield in the United Kingdom goods and services whose aggregate value at existing prices is £4,000 mn.—that is, about £85 per head per annum, or about £300 per family. Per occupied person this is about £170 per annum, or at 50 weeks and 46 hours' work a week 1s. 6d. per hour. Thus on a very general view one hour's work averaged over all is equivalent to goods or services that can be purchased for 1s. 6d. Examples are 2 quartern loaves, or 1 lb. of best meat, or 3 quarts of milk, or 18 miles personal transport by rail, or 1½ miles by taxi, or 2 minutes of a consultant's time, or 9 units of electricity, which would lift 100 tons 100 feet if expended without loss in a dead haul.

To get an idea of the change that has already been made in the lifetime of the oldest of our Fellows, we may make a comparison with prices in 1860. For that date aggregate income has been estimated

at £750 mn., £26 per head. Taking again that half the population was gainfully occupied, and assuming 50 weeks' work of 60 hours per week, we obtain about 4*d.* for the average value of an hour's work. (The change from 4*d.* to 18*d.* in 78 years is consistent with the estimate that wages for a week's work had increased in the ratio 100 : 350 and hours had been reduced from 60 to 46.) In 1860 this 4*d.* would buy about 3 lb. of bread, or 10 ozs. of middling meat, or 3 pints of milk, or 4 miles of slow rail transport, no motor transport and no electricity, but energy generated from perhaps 40 lb. of coal; or it would pay for one-twentieth part of a lawyer's letter.

At each date, of course, one hour's work would buy approximately one hour's service of the same quality.

This enumeration may serve to give a very rough idea of the extent and nature of the gain of productivity in 80 years. If we had taken the fall in wholesale prices—a very unsatisfactory measurement for this purpose—we should have reached the conclusion that the productivity of an hour's work had increased five-fold in the period, but this at best could only relate to commodities, not to services. It is to be noticed that a substantial part of the increased productivity has been appropriated to a reduction of the hours worked weekly.

If this achievement could be repeated, we should have gone a long way towards the four hours' work per diem for the present output, and no doubt optimists would hold that with an improvement in allocation of the product we should approach Bellamy's millennium.

Let us now consider the question in more detail.

A division of the problem that may be appropriate for statistical investigation is six-fold: (1) primary products; (2) energy; (3) manufacture; (4) agriculture; (5) distribution; (6) personal service. Though this division may be practical, it is hardly logical. The winning of primary products is only arbitrarily distinguishable from manufacture; for example, in the timber industry the felling of a tree from the work of a saw-mill. A considerable amount of distribution is undertaken in manufacture and in agriculture. Distribution of goods is with difficulty separated from personal service. But the division corresponds with industrial and occupational statistics, and perhaps would serve to make a programme of investigation such as I have suggested.

Each of these classes has a distinctive history during the past century and a half, and in some of them no doubt reasonable forecasts could be made of their future. I proceed to consider them in order.

Primary Products.—The sporadic distribution of minerals over and in the earth and their accidental discoveries have led to great variation in their relative prices, or to the labour of making them available.

Also new processes of extraction of metals from their ores have resulted in a virtual extension of supply, and sometimes in cheaper products. But there seems no reason to expect that the metals, natural chemical substances, timber or rubber will be easier to obtain in the future than at present, while some much-needed substances, such as radium, are rare and expensive. New discoveries of sources are less probable now that so much of the earth's surface has been surveyed, and for timber and other vegetable products the problem tends to be that of replacement of the violated forests and plantations. On the other hand, the production of synthetic substitutes may ease the situation.

Energy.—I believe that some engineers anticipate a great reduction in the cost of energy. To avoid going far into this region, with which I am quite unfamiliar, let us suppose that energy is as free as air, and consider how much expense or labour would then be saved. Energy is at first sight already very cheap. According to the preliminary summary of the Census of Production for 1935, in all the industries included 7,650 mn. B. T. Units of electricity were purchased for £66·7 mn.—that is, 2·1d. per unit. This 2d. is not much to pay for the energy that will lift 11 tons 100 feet. Industry, however, was not content with electric energy that yielded 2×10^{16} foot-pounds, for about £125 mn. was also spent on coal and other fuel.

In 1930—the corresponding number is not available in 1935—the horse-power in use in the Census of Production Industries (excluding Electricity Supply Undertakings) was 15 mn., or 30×10^{12} foot-pounds per hour—that is about 7×10^{16} foot-pounds per annum. This is about 16,000 mn. foot-pounds per operative. The number does not appear to be so large when we express it as nearly 4 horse-power per operative. This quotient, of course, varies from industry to industry; it was about 6 H.P. in iron and steel production, 4 in mining and in chemicals, $2\frac{1}{2}$ in textiles, and 0·4 in clothing.

Presumably if energy were cheaper more would be used; but the immediate point is that the expense of fuel and electricity was only about 6 per cent. of the value of the gross product, and $10\frac{1}{2}$ per cent. of the value of the net product. This gives data for the answer to my question, What would be the saving if energy were free?

Another approach is from the numbers of insured persons employed in coal mines or electric or gas undertakings. It is about 10 per cent. of all insured men, 7 per cent. of all insured persons. If we exclude services, distribution and professions, but include agriculture, the proportion of men is raised to about 12 per cent.

In the railways of Great Britain the expense of fuel and purchased electricity was £11·6 mn. in 1935—that is, 9 per cent. of their total expenditure and 7 per cent. of their total receipts. The work done

was about 16,400 million ton-miles and about the same number of passenger-miles. (Transport of mails and parcels by passenger train is not included in these totals.) It is not possible to divide the fuel expense between goods and passenger traffic from the figures before me, but it may be of interest to show the small fuel expense in passenger traffic. If the whole of the fuel expense were devoted to goods traffic, the result would be 6 ton-miles for 1*d.*; the actual number for 1*d.* is, of course, greater than this. The receipts for 6 ton-miles average 8*d.* The Coronation Express from Edinburgh to King's Cross weighs about 500 tons and travels 392 miles in 6 hours. Its full complement of passengers is 216, so that 85,000 passenger-miles may be accomplished. It carries 8 tons of coal, part of which is not used. The supplementary charges to passengers, if all seats are occupied for the whole journey, amount to £48, which pays for the coal many times over. 2 cwt. of coal are more than sufficient for 1,000 passenger-miles, even at this great speed. We may conclude that the fuel expense is almost negligible in relation to the whole cost of passenger transport.

From the London Passenger Transport Board's Report for 1937-8 it may be computed that the average cost of electricity for hauling and lighting a railway coach, tram or trolley-bus is about 1.3*d.*, and per passenger journey is 0.17*d.*

Manufacture.—Before proceeding to discuss manufacture it will be well to emphasize the almost insuperable difficulties of measurement of general productivity, especially over long periods.

The essential obstacle is that only those products which can be measured in weight, size or number, and are of nearly unchanged quality, can give rise to series which can be combined together. This rules out all advanced manufactures, except that indirect measurements can in some cases be found from the materials or partly manufactured goods used. Thus for machinery, motor cars, clothing except the least elaborate, and for many other classes there is no satisfactory measurement. In so far as there is a tendency to more elaborate production, so that more and more work is put on to a unit of material, index numbers of production tend to under-rate increases.

In Dr. Rhodes's Memorandum,* where some 130 separate industries are classified, direct measurements of change of output were found for goods which accounted for only about one-half of the aggregate net output. He increases the proportion virtually to three-quarters by assuming that in each industry for which there are any data, the numbers may be taken, for the purpose of a weighted

* London and Cambridge Economic Service. Special Memorandum No. 47. *Output, Employment and Wages in the United Kingdom, 1924, 1930, 1935.*

average, as representative of the whole industry. This is, no doubt, better than ignoring all parts of an industry for which there were no data, for in that case an industry such as coal-mining would be over-weighted in the average, simply because the product can be and is measured. In fact, the increase in output for all the industries included is about 16 per cent. from 1930 to 1935 if only the weights of ascertained goods are used, 23 per cent. by Dr. Rhodes's method, and 22 per cent. if the industries are classed in 14 major groups, and it is assumed that the numbers obtained for the aggregate of industries within each group are representative for the whole group.

But over short periods at least the methods applied for index-numbers of production seem to be satisfactory except for the bias due to the assumption of unchanged quality already named. Thus Dr. Rhodes's numbers are consistent with the Index published by the London and Cambridge Economic Service; and in the Final Report of the 1930 Census (p. 41) it is stated that while the Board of Trade's index, previously published, showed an increase of 3.2 per cent. over 1924, the corresponding number for the same range of industries from the fuller data of the Census gave 2.9 per cent. But at the same time if trades not included in the index, such as Building, Local Authorities' Undertakings, Printing, etc., are brought into reckoning from the Census data, the increase in the 6 years was 8.1 per cent. It is thus evident that a great deal may depend on the scope of the index, which should always be carefully defined.

Over long periods, or over periods of rapid change in the nature of the output or the relative importance of industries, there is another consideration of a disturbing nature. It is well known that in compiling weighted index numbers of prices something depends on whether we use as weights the relative importance of commodities at the beginning of the period in question (as in the case of the Cost-of-Living Index), or reverse the process and use as weights the relative importance at the end of the period (as in the case of the average values of Imports or Exports).^{*} Since increase of quantity is normally positively correlated with decrease of price, the first method usually gives a higher number than does the second. The same consideration applies to index-numbers of output.

Thus Dr. Rhodes finds that for all industries the first method gives an increase of 23 per cent. in output from 1930 to 1935, while the second method yields only 14 per cent. The first is greater than the second not only in the total, but in nearly all the groups and in the majority of the larger individual industries.

^{*} The change in average values is obtained thus (using the notation of the next paragraph): $I = \frac{\sum v}{\sum V} \div \frac{\sum Pq}{\sum PQ} = \frac{\sum pq}{\sum PQ} \div \frac{\sum Pq}{\sum PQ} = \frac{\sum qp}{\sum QP}$.

Consider the simple case where there are two commodities produced in equal numbers at the same price—for simplicity let one of each be produced for 10s. Now, suppose that invention and mass production result in 10 units of the first commodity being produced for 10s., while there is no change in the amount or price of the second. What has been the increase of output? If we apply the first method and revalue the second output at the original price, we get for 20s. what would have cost us 110s., a change in the ratio 1 : 5·5. But if we value the earlier purchases at the price of the later year, we find that the goods would have cost 11s., and the change is 11 : 20, or 1 : 1·8. If the first commodity did not exist at the earlier period, the first method gives an indefinite result, the second the ratio 1 : 2 on reasonable hypotheses. Irving Fisher advocates taking the Geometric mean of the two results, arguing that each has an equal claim to be the measurement. I am inclined to think that the second method is more correct, or perhaps I should say more useful over a long period.

It is useful to set out the working of this and allied problems in algebraic form, especially to show how far the difficulty can be evaded by taking short intervals and the chain method.

Write P, Q and p, q for typical prices and quantities at two dates and $V = PQ, v = pq$ for values.

Then the index of production is $\Pi_1 = \frac{\Sigma Pq}{\Sigma PQ} = \frac{\Sigma V \cdot \frac{q}{Q}}{\Sigma V}$ on the basis of the prices in the first period, and $\Pi_2 = \frac{\Sigma pq}{\Sigma pQ} = \frac{\Sigma v}{\Sigma v \cdot \frac{Q}{q}}$ on the basis of the prices in the second period.

Consider the special case of two commodities where there is equal expenditure on each at each date, so that $V_1 = V_2 = v_1 = v_2$.

Then the index numbers are $\Pi_1 = \frac{1}{2}(r_1 + r_2)$ and $\Pi_2 = \frac{2}{\frac{1}{r_1} + \frac{1}{r_2}}$,

where $r_1 = \frac{q_1}{Q_1}, r_2 = \frac{q_2}{Q_2}$; that is, they are the Arithmetic and Geometric mean of the relative amounts of the commodities at the two dates.

For illustration take

		V	Q	P	v	q	p	r
First commodity	...	10	1	10	10	10	1	10
Second commodity	...	10	1	10	10	1	10	1

$$\Pi_1 = \frac{10 + 1}{2} = 5·5; \quad \Pi_2 = \frac{2}{\frac{1}{10} + \frac{1}{1}} = \frac{20}{11} = 1·8.$$

Now if we increase r_1 indefinitely, increasing q_1 , diminishing p_1 , and keeping all the other terms unchanged, Π_1 increases indefinitely and Π_2 approaches 2. The product $\Pi_1 \times \Pi_2$ remains = 10.

If the first commodity did not exist at the first date we might have

		V	Q	P	v	q	p	r
First commodity	...	0	0	?	10	10	1	∞
Second commodity	...	10	1	10	10	1	10	1

$$\Pi_1 = \frac{0 \times \infty + 10 \times 1}{10}, \text{ and is undefined,}$$

$$\Pi_2 = \frac{10 + 10}{10 \div \infty + 10 \div 1} = 2.$$

Now consider the effect of breaking up the period into n intervals, the expenditure on each commodity being the same, unchanged throughout the period. Also suppose the price of the second commodity to be constant.

			V	Quantities in successive periods.				
First commodity	...	...	10	a_0	a_1	a_2	...	a_n
Second commodity	...	...	10	1	1	1	...	1

Apply the chain method, first using the Π_1 formula for each interval and multiplying the n values to obtain a measurement for the whole period, and secondly by using Π_2 similarly.

The first gives successively $\frac{1}{2}(a_1 + 1)$, $\frac{1}{2}(\frac{a_2}{a_1} + 1)$. . . with the result for the whole period :

$$\Pi_1 = \frac{(a_0 + a_1)(a_1 + a_2) \dots (a_{n-1} + a_n)}{2^n \cdot a_0 \cdot a_1 \dots a_{n-1}}.$$

The second gives :

$$\Pi_2 = \frac{2^n \cdot a_1 \cdot a_2 \dots a_n}{(a_0 + a_1)(a_1 + a_2) \dots (a_{n-1} + a_n)}.$$

$$\therefore \Pi_1 \times \Pi_2 = \frac{a_n}{a_0}, \text{ however the period is broken up.}$$

In the case of nine intervals and equal increments to a , we may write $a_0 = 1, a_2 = 2 \dots a_n = a_9 = 10$.

Then $\Pi_1 = 3.52, \Pi_2 = 2.84, \Pi_1 \times \Pi_2 = 10$, Geometric mean 3.16, whereas when the period was taken as a whole $\Pi_1 = 5.5, \Pi_2 = 1.8$.

Under the same conditions of equal constant expenditure on two commodities, but replacing the unit quantities of the second commodity by $b_0, b_1 \dots b_n$, we find :

$$\frac{\Pi_1}{\Pi_2} = \left\{ \frac{1}{2} \left(\sqrt{\frac{b_1 a_0}{b_0 a_1}} + \sqrt{\frac{b_0 a_1}{b_1 a_0}} \right) \right\}^2 \cdot \left\{ \frac{1}{2} \left(\sqrt{\frac{b_2 a_1}{b_1 a_2}} + \sqrt{\frac{b_1 a_2}{b_2 a_1}} \right) \right\}^2 \dots$$

$$\left\{ \frac{1}{2} \left(\sqrt{\frac{b_n a_{n-1}}{b_{n-1} a_n}} + \sqrt{\frac{b_{n-1} a_n}{b_n a_{n-1}}} \right) \right\}^2$$

$\therefore \Pi_1 > \Pi_2$, since the sum of a positive number (other than unity) and its reciprocal is greater than 2, however the period is divided.

In this case $\Pi_1 \times \Pi_2 = \frac{a_n b_n}{a_0 b_0}$, however the period is divided.

If we remove the conditions of equal and constant expenditures, we have for two commodities, $\Pi_1 > \Pi_2$

$$\text{if} \quad \left(\frac{q_1}{Q_1} - \frac{q_2}{Q_2} \right) \left(\frac{p_1}{P_1} - \frac{p_2}{P_2} \right) < 0,$$

where the Q 's and P 's are quantities and prices at the first date, and the q 's and p 's at the second.

In words, the condition is that the relative increase in quantity is the greater, where the relative increase in price is the less.

Where expenditures are kept constant $\frac{p_1}{P_1} = \frac{Q_1}{q_1}$, $\frac{p_2}{P_2} = \frac{Q_2}{q_2}$, and the condition becomes

$$\left(\frac{q_1}{Q_1} - \frac{q_2}{Q_2} \right) \left(\frac{Q_1}{q_1} - \frac{Q_2}{q_2} \right) = - \left(\sqrt{\frac{q_2 Q_1}{q_1 Q_2}} - \sqrt{\frac{q_1 Q_2}{q_2 Q_1}} \right)^2,$$

which is always negative.

It is not necessary in the foregoing formulæ to assume equal expenditure on the two commodities, but only to assume constant expenditure on each commodity. For we may write

$$\Pi_1 = \frac{V_1 r_1 + V_2 r_2}{V_1 + V_2}, \Pi_2 = \frac{\frac{V_1}{r_1} + \frac{V_2}{r_2}}{\frac{V_1}{r_1} + \frac{V_2}{r_2}},$$

so that

$$\frac{\Pi_1}{\Pi_2} = \frac{V_1^2 + V_2^2 + V_1 V_2 \left(\frac{r_1}{r_2} + \frac{r_2}{r_1} \right)}{V_1^2 + V_2^2 + 2V_1 V_2} > 1, \text{ since } \frac{r_1}{r_2} + \frac{r_2}{r_1} > 2, \\ \text{unless } r_1 = r_2.$$

I give one other numerical illustration which will be useful in the sequel. As before, let 10s. be spent on a manufactured article at two dates, 1 unit being purchased at the first, 10 at the second. Replace the second commodity by 1 unit of service at 5s. at the first date and 2 units of service at 5s. each at the second. The first method shows an increase of output in the ratio 1 : 7.3, the second in the ratio 1 : 3.3. The Geometric mean is 4.94.

$$(Q_1 = 1, Q_2 = 1, P_1 = 10, P_2 = 5; q_1 = 10, q_2 = 2, p_1 = 1, p_2 = 5. \\ \Sigma Pq = 110, \Sigma PQ = 15, \text{quotient} = 7.3. \\ \Sigma pq = 20, \Sigma pQ = 6, \text{quotient} = 3.3).$$

If we apply, in spite of the difficulties and uncertainty, the computations of physical output in the Census of Production industries to the numbers employed, we obtain

				Physical Output per Head of	
				Operatives	All Employed
1924	...	...	...	100	100
1930	...	...	...	112	110
1935	...	...	...	140 or 130	136 or 126

The lower figures for 1935 come from the second method described above.

It would perhaps be possible by a re-examination of the data of the 1907 Census to obtain a rough comparison of output and numbers employed between 1907 and 1924, and to ascertain whether the presumed increase in efficiency in the War period balanced the reduction of hours in the working week; but a preliminary examination suggests that general index numbers of production are inappropriate, and that it would be necessary to consider each industry separately. Indeed, in the later periods it would be much more satisfactory to examine the figures in detail, as can be done from the tabulations in the Final Report of the 1930 Census and in Dr. Rhodes's Memorandum, than to depend on these general weighted averages. This is one of the tasks I suggest for the Industrial Research Section.

After this long digression on methods of measurements, I return to the main line of my analysis. What are the limits of efficiency in manufacture? The key-word in recent times is "rationalization," which may be considered at the same time as invention. I suppose that it includes the most economical use of the best machinery, good co-ordination of processes, careful adaptation of tasks in the best physical conditions to suitably trained workers, cost accounting and acute intelligence of management. In old-established industries it needs much scrapping of existing machinery and plant and erection of new buildings. In most large-scale industries it involves considerable capital expenditure. A very serious limitation to rationalization is the scarcity of managerial ability, especially when it implies, as is usual, very large-scale production. Against the advantages of greater efficiency and economy in production we may put the fact that they can only be realized when products are standardized. Standardization not uncommonly means the sacrifice of individual preference, and except for staple goods and foods and for such minor products as nails and screws, people with any margin for free expenditure prefer to pay more for things which please their personal taste.

Products for which large-scale and standardized manufacture are suitable are in fact already produced very cheaply, and in my

judgment there is not much more to be gained in the production of the more necessary kinds of machine-made goods already in common use. But invention and discovery continue to make available new commodities, which rapidly become adapted to large-scale, machine-made, and standardized manufacture. Obvious examples are bicycles, motor-cars, telephones, wireless apparatus, cinema films; I hope that the next development will be cheap refrigerators. When estimates are given of the course of real wages, measured by a cost-of-living index number, a very large part of the increased command of money over machine-made goods and in the enjoyment of new inventions is lost, especially when the numbers are applied to incomes not wholly devoted to necessities.

An enormous outlay in equipment is necessary before everyone can enjoy advantages of the new inventions of the past 50 years. This can be seen by comparing a primitive dwelling in a backward country with a modern house with water, electric light and power, air-controlled temperature, radio, refrigerator, vacuum cleaners, and other labour-saving devices, garage, and good-surfaced roads. With this put the capital outlay in rationalizing production. Leaving aside the provision of this capital or the interest on it, we can see that the cost of renewal, or the depreciation, would be enormous, and of this much is direct labour which is not subject to economy in use. This consideration is, of course, also relevant to the supply of energy.

From the Census of Production statistics it is suggested that there has been since 1924 a considerable increase in output by a diminished labour force, but the country is not yet equipped with all that invention has made possible, and even in an industrialized and rich country we are very far from Bellamy's or Morris's Utopia, where everyone could have as much as he liked of everything, and the lack of occupation was causing a return to hand-work.

Agriculture.—No doubt under the most favourable circumstances, such as exist in the United States, grain and cotton can be produced at a very low cost, and other countries with a developed foreign trade can take advantage of this cheapness. It will, however, be a very long time before cultivation and harvesting by machinery are universal. Direct labour is general not only in India and China, but also in the widespread districts of peasant cultivation in Europe. If we got our daily bread for nothing, instead of paying for it by half-an-hour's work a day, we have still to get meat and milk. I suggest to the Agricultural Research Section the question how much capital and labour are necessary under the most favourable circumstances to provide adequate rations of meat, milk and other animal products. Otherwise, since I have no special acquaintance with agricultural problems, I pass on to my next division.

Distribution.—More than one-quarter of the occupied population in Great Britain in 1931 was engaged in commerce, clerical occupations, dealing, transport or communication; less than one-half in the Census of Production industries; nearly one-fifth in professional and personal services, and about 7 per cent. in agriculture. While in the Census of Production group a smaller number of persons have produced a greater output at nearly the same aggregate cost, and consequently with a lowering of price, there has probably been no similar movement in other occupations, except to some extent in agriculture. Some of the consequences of this contrast were pointed out by Mr. Keynes in a communication to *The Times* of September 13th. The real income of the non-manufacturing section of the community has been increased by the greater efficiency of physical production.

There is no ready measurement of distribution. We could estimate numbers engaged in its various branches and their earnings. We could perhaps make an index of the changes in the quantities of various classes of groups handled, and combine them into a weighted average. The transport undertakings could conceivably supply ton-mileage statistics, but these would be subject to the fallacy, apparently held by railway experts, that there is a virtue in transportation proportional to its length. On the other hand, the number of tons carried is not a complete measurement.

There is no doubt that a greater proportion of effort is devoted to distribution now than at an earlier period. From the *Ministry of Labour Gazette* for December 1937 we can compute the relative changes from 1923 to 1937 in groups of occupation.

				Numbers of Insured Persons in Employment.	
				June 1923.	June 1937.
Mining, manufacture, building ...	...	...	...	100	116
Distribution ... ..	...	...	...	100	164
Transport * ... ..	...	...	...	100	121
Commerce, banking, finance ...	...	...	...	100	122
National and Local Government ...	...	...	...	100	123
Miscellaneous services ... ..	...	...	...	100	116
All ... ..	...	...	...	100	125

* A great proportion of railway employees is excluded from these statistics.

The proportion of insured persons occupied in distribution increased during these 14 years from $11\frac{1}{2}$ to 15 per cent. If non-insured salaried workers were included, no doubt there would be some modification in the proportions.

Thus the numbers occupied in distribution increased much more rapidly than the numbers in manufacture, more rapidly than the physical output of manufacture, and much more rapidly than real income or the population.

It would be very interesting if the causes of this change could be analysed. Is the increase because the population is more scattered in the suburbs, or further from the stores in the towns, or is the public demanding better and more personal service, or is distribution becoming increasingly inefficient?

No doubt there is room for rationalizing distribution, mainly in the direction of larger consignments, less rapid delivery and less competitive waste. I cannot think that it is economical to bring a 2 ton lorry half a mile to deliver to me a pound of tobacco the day after I order it. To some extent the increase may be due to the desire of the public for personal attention, for which they are willing to pay.

There is a lamentable want of information about the cost of distribution for different kinds of goods from the place of production to the final consumer. I wish that some research could be devoted to this.

I suppose that the delivery of milk from the farm to the house is the most striking case of a large ratio of distributive to productive costs; it appears (*Planning*, No. 93, p. 12) that the consumer pays 26*d.* per gallon, of which 11*d.* goes to the retailer, 5*d.* for transport from farm to retailer, and 10*d.* to the farmer. Whatever re-organization is made, the cost of distribution must remain considerable.

But transport and delivery form only one part of the existing cost of distribution. There is the whole business of shop-keeping, of the expense of overcoming "sales resistance" and of advertising. If we only used standardized goods and did not bother about new inventions till they were standardized, no doubt a great deal of effort would be saved, but we should still find some way of spending our money. Bellamy, in *Looking Backward*, assumed that, if all purchasing was concentrated at one large departmental store in each region, in which samples of everything were exhibited, there would be an enormous saving; but he did not attempt to estimate the amount of clerical and accounting labour involved, nor the expense of delivery. In fact, existing departmental stores, which essentially do not differ much from his ideal, are not markedly more economical than individual shops. In any case, I see no way of measuring efficiency of distribution in terms of service rendered and effort used.

Personal Service.—There has been a considerable and continuous increase in the absolute and relative numbers engaged in professional occupations—doctors, teachers, entertainers and so on. Some part of the population has been freed by the greater efficiency of physical production, and is devoted to less material ends. No doubt doctors, nurses and teachers are better qualified than in earlier times, but there

is no suggestion that fewer are needed, however skilled they may be. In one sense entertainment has become more efficient—that is, with the development of wireless and the cinema. But the numbers classified under Entertainments and Sports Occupations increased in Great Britain from 91,000 in 1921 to 124,000 in 1931. If hours of work diminish, we may expect that even more effort will be given to entertainment, but this is hardly relevant to the main question that I am considering.

The wider problem is this: given that material goods can be produced with progressively less effort, how far is the whole of human exertion lightened? The question is not confined to the two million women and the half-million men classified under personal service in the 1931 Census. There are also some ten million wives or widows, technically unoccupied, the great majority of whom are engaged in household work, cooking, cleaning, mending, minding the children, in the ten million households of Great Britain, sometimes a full-time job, longer than trade union hours, sometimes only a few hours a day. Part of this can be lightened by labour-saving equipment, part of the preparation of food is done in the factory; but the most perfect house does not run and clean itself; children cannot be tended by machinery, nor other young animals, except perhaps chickens. Though a machine can cut grass, it cannot plant flowers or weed beds. Including unpaid domestic work, distribution and commerce, it may be estimated that half of the population over 14 years old is occupied in rendering services which mechanical aid and organisation can lighten and improve but cannot supplant.

Now return to my measurement on p. 8. There it is supposed that at one date twice as much is spent on one commodity, which I now identify as manufacture, as on another, which I now name service. At a later date the same sum is spent on manufactures, but ten times as much is obtained, while twice as much is spent on service, the unit being unchanged in price. Expenditure has increased by one-third, output three- or seven-fold, according to which method of measurement is used.

Another numerical illustration may be given. Suppose that now equal numbers are employed in producing goods and rendering services, all working 48 hours weekly. Suppose that production becomes twice as efficient, and that it is desired to produce the same goods and x per cent. more services, all in a uniformly reduced working week, services taking as many hours per unit as before. What will be the new working week? The answer is $36 + 0.24x$. If there is no increase in service the number of hours is 36; if services increased 25 per cent., it becomes 42; if 50 per cent., 48 as at first.

Improved efficiency in manufacture can be used for greater

leisure, for more services, for greater output of goods, or for armaments. In recent times it has been used for all these purposes.

In concluding what has, I hope, been a common-sense review of the possibilities of greater efficiency, I make a statement which I should have thought was commonplace, if the contrary were not so often assumed. However great the increase may be in the future, we cannot enjoy its more lavish fruits in the present.

PROCEEDINGS OF THE MEETING

LORD KENNET, in proposing a vote of thanks to the President for his stimulating address, desired to say a preliminary word welcoming him to the Chair. Professor Bowley had mentioned his long association with the Society. It was an association to which all present looked back with pleasure. He knew of no institutions which made more characteristic or more fertile contributions to the national culture than the Royal Societies, and among those bodies the Royal Statistical Society was certainly not the least distinguished. Indeed, he wondered whether such a body as this was not among the most useful, for the knowledge which it introduced at "low temperature," so to speak, into the body politic, was helpful in reducing the present fever and ferment of affairs.

Professor Bowley had been so long associated with the work of the Society that it was a special pleasure to greet him as its President. It would be difficult to say which of the two constituents of his present audience felt the greater pleasure—his contemporary colleagues who had been acquainted for so long with the high quality of his contributions to the science, or his younger colleagues, his pupils, who owed him so much in their education.

It was the admirable custom of the Society to organize its Presidents in the form of the sandwich, so that a President who had some acquaintance with the subjects of the papers read was succeeded by one who had no such acquaintance. He was himself followed by Professor Bowley, who was acquainted with every side of the statistical field. This arrangement was most stimulating to those who read papers and took part in discussions, because, when it came to the turn of a President like himself, who knew nothing of statistics, they could feel while making their contributions that there was at least one person in the audience who would not detect them in any fallacy, and when he was succeeded by such a man as Professor Bowley, the readers of papers and the contributors to discussions would feel that however profound their observations, however high they might soar, there was at least one person who would understand them. So each President in turn gave encouragement by his presence.

The President received great assistance from a most helpful and co-operative staff. The new President would appreciate this as much as he himself had during the last two years.

They had listened to the address with pleasure, and with that gratitude which was a lively expectation of favours to come. He had been wondering, while hearing the President's analysis and suggestions regarding the growth of production and the increase of efficiency, how soon the time would come when the greater part of the human species might desist from all kinds of labour, and leave all active toil to a minority. When that time came he himself would, as usual, be on the side of the majority.

Poetical imaginings would keep on thrusting themselves forward, and again he had wondered whether, when that time arrived to which the President's analysis had directly pointed, the idle part of the species would be in the position of masters or in the position of servants of the race. Were the capitalists and the aristocrats to become parasites in the sense of living at the expense of the community, or were they to be the victims of the few who controlled the productivity of the world? If Professor Bowley and his colleagues could only tell them the form that this future evolution would take, they would know on which side to range themselves and their families in the future division of the species.

Like all stimulating addresses, this one had suggested various trains of thought which would be quite foreign to the author's own mind in framing it, but he wished again to assure Professor Bowley with what great pleasure they had listened to a stimulating address and saw him in the Chair.

PROFESSOR MAJOR GREENWOOD said it was a great pleasure to perform his last official act as ex-President, and second this vote of thanks to Professor Bowley. His address was interesting to all sections of the Society, and it had interested him especially because in his own Inaugural Address he had raised the question of the right use of, presumably, increasing leisure. In listening to the President, one of those little doubts had crept in as to whether, first of all, leisure was a desirable thing and, secondly, whether leisure *was* going to increase. The other night he was reading that most interesting volume of Cambridge lectures which had just been printed, *Background to Modern Science*. It began with a lecture by Professor F. M. Cornford on the ancient point of view regarding scientific thought. Professor Cornford remarked that ancient men of science looked at the universe from a totally different point of view from that of the modern man of science. The modern young laboratory worker would be pleased to see in the speculations of Lucretius and others anticipations of what he regarded as modern discoveries; but he would be a little irritated to find them embedded in a rock of what he would regard as pure nonsense, and he would be a little apt to think of the ancients as something like clever children with bright ideas but untrained minds. Professor Cornford went on to suggest that this was not a very adequate summing up of ancient philosophy, and he proceeded to the comparatively easy task of guying Macaulay's panegyric of the different aim of scientific thought supposed to have been given by Francis Bacon. He then remarked that, of course, Macaulay was right as to the enormous increase of commodities.

As Macaulay said, we had better spy-glasses, and, as he might have said, better and larger guns, and poison gases. Professor Cornford said that no doubt the enormous increase in happiness of the inhabitants of Europe as compared with the days of Marcus Aurelius and the Periclean age of Grecian civilization was due to this changed aim in science. The President's remarks on the utilization of leisure reminded him of this.

The wider problem appeared to be this: Given that material goods could be produced with progressively less effort, how far was the whole of human exertion lightened? A question suggested from a different angle by a professor of ancient philosophy. This non-partisan attitude seemed to be very characteristic of the whole of the President's scientific work. There had been very few statisticians who had so consistently made a purely intellectual examination of the problems which they had had to consider. Taking as his field to a large extent economic statistics, and particularly what one might call the human factor in economics, being the first authority on the study of statistics of wages, the President had never allowed himself to be diverted from the intellectual side of the problem. It was very tempting to be aggrieved when one noticed how very slowly the results of scientific discovery, particularly perhaps in this field, were recognized and acted upon. They were often inclined in after-dinner speeches and that kind of thing to enlarge upon the consideration that intellectual work was its own reward, that the researcher had the joy in his research, and did not require the praise of the multitude, that he was content with his own work. They all said this, and some of them meant it, and he imagined that the most perfect example within their experience of that belief rendered kinetic and actually informing a scientific student's work was to be found in the career in this field of their President.

A considerable number of his ideas had been exploited by other people without acknowledgment. But if the number of persons, servants of the State and others, who, either as his direct pupils in the university or as his indirect pupils studying his books and the papers he had read to the Society, were to put down the debt that not merely statistical science but industrial organization owed to the President, the total amount would be found very far to exceed any kind of recognition from the world outside that he had received. The only recognition that they, his colleagues, could give him was to seat him in the Presidential Chair, and everyone in the room, and a far larger number of Fellows of the Society who could only read the *Journal*, would look forward with pleasurable anticipation to his two years of office.

LORD STAMP said that this vote of thanks had been proposed and seconded with such force and eloquence that it was moved already of itself, and needed nothing in the way of a shove from him. But whatever those present might feel about it, he would not like to deny himself the pleasure of being associated with the vote of thanks and using the privilege of an ex-President so to do. It gave him a most peculiar pleasure to see Professor Bowley in the Chair. Reference

had been made to his extraordinary influence throughout a wonderful life of intellectual activity—an influence which he could only compare with that of Professor Marshall of Cambridge in economic analysis. It was an influence felt all over the world, and not only in a first but a second and third generation. He himself could never remember the time when Professor Bowley was not regarded as most pre-eminent in the statistical field, the representative in this country and all over the world of statistical science. So long had this service been rendered by him that it was perfectly clear that he had earned the right to do what he had done that evening—namely, to allow himself a sort of mental explosion of the valuable fragments now lying all around them. He had told them that here were things which they could take up and hatch out, plant out, or proliferate, as the case might be. He hoped that he would continue this process, just as the finest horticulturists out of their bounty would allow others to take away spare cuttings from their superabundant plants and use them to raise a similar abundance in their own fields. He hoped that the thoughts which had been exploded from the President's brain would stimulate the imagination and germinate in the minds of the young statisticians and, for that matter, the minds of the older ones as well. For he had shown in many directions what remained to be done to analyse the increasing complexity of the world of production and distribution.

Sometimes he, Lord Stamp, looked over the papers of former Fellows of this Society sixty or eighty years ago. Since those days the increase of productivity per presidential hour had multiplied even more greatly than in the industrial field. One had only to compare the simplicity of the outlook of those days with the concentration of mental effort and the elaboration of technique of to-day, to make one reflect how much this was so.

Those of them who knew Professor Bowley best might be surprised at some new features which were apparent in his work. Any good man could do good work in good conditions, but it took a great man to do good work under adverse conditions, and he had seen Professor Bowley recently applying his mind with full scientific devotion to abstract problems in the city of Prague with the world going to pieces all around him. Having been extruded from Prague, he continued econometrics unperturbed in Poland amid similar distractions. They knew that in the Presidential Chair he would be, as always, provocative and whimsical, and would show all those great properties they knew him to possess.

His Inaugural Address illustrated the characteristics of his method. They realized that in the most simple or apparently simple directions there were hidden complexities. Professor Bowley had made reference to such a simple unit as the passenger-mile on a railway. There was the passenger, and there was the mile—what could be more indestructible, absolute and everlasting than that as a unit test? Yet all the time in this quantitative consideration certain qualitative distinctions were creeping in. The President had compared the passenger-mile of to-day with the passenger-mile of some years ago. But it had to be remembered that the locomotive also

warmed the passenger and lighted him, air-conditioned him to different degrees, and upholstered him, and if it was passenger-space-mile they were considering, that changed too, and there might be something to be allowed on fuel consumption in that direction. He instanced this only to show that qualitative elements came into an apparently solid and indestructible quantitative measurement, and all this was rather disconcerting to the statistician.

But one thing had stood out pre-eminently in the President's teaching all his life—namely, the condemnation of those who got busy with their statistical technique without first studying in every respect their material, going right back to the person who made it up, going into the statutory basis on which so many official figures were computed. Unless the student had first adequately studied the material, he was not entitled to do his higher mathematics upon it, for any errors that were there at the beginning would certainly not have disappeared when the final product came out of the machine.

He had the greatest pleasure in supporting the vote of thanks.

On being put to the meeting the vote of thanks was carried unanimously and the proceedings then terminated.

As a result of the ballot taken during the meeting the candidates named below were elected Fellows of the Society :—

Frank Hardy Ashmore.	Edward Alban Ede.
Robert Eric Beard, F.I.A.	John Daniel Goldstein, A.I.A.
Dennis Bellamy, F.L.A.A.	Kai Thon Lim, Ph.D.
Brahma Datta Bhargava, B.Sc., LL.B.	Hugh Geoffrey MacColl, M.A., B.Sc.
Khushiram Tolaram Bhojwani, B.A.	Václav Myslivec.
Harold Scott Booker.	Samuel Camoron Potter.
Frank Law Bradshaw, F.I.A.	Ahmed Ezzeldin Abdel Rahman.
Ernest Roy Bransby.	Thomas Maurice Ridley.
John Joseph St. Lawrence Carson.	N. S. R. Sastry, M.A., M.Sc.
Ranchhoddas Varjivandas Damania.	C. W. Vickery.
Henry Ellis Daniels.	Thomas Whitwell, F.I.A., F.R.A.S.

Corporate Representatives.

David Cheyney, B.Sc.	<i>representing</i> The Jewish Health Organization.
Sydney Larkin.	<i>representing</i> The Institute of Municipal Treasurers and Accountants.
Sidney Augustus Poyton.	<i>representing</i> The Library, University of Reading.

THE GEOGRAPHICAL DISTRIBUTION OF CROP PRODUCTIVITY IN ENGLAND

By M. G. KENDALL

[Read before the ROYAL STATISTICAL SOCIETY, December 20th, 1938, the
PRESIDENT, PROFESSOR A. L. BOWLEY, C.B.E., Sc.D., F.B.A., in the Chair.]

1. It is well known that an area producing high yields of wheat will, as a rule, produce yields of other cereals which are better than the average—in other words, the yield of wheat is positively correlated with the yields of other cereals. The starting-point of this inquiry was the discovery that a similar relationship exists between county yields of the principal crops which are grown commercially in England at the present time.

2. Estimates of crop yields for each county in England and Wales are obtained every year by the Ministry of Agriculture and are published in "Agricultural Statistics, Part I." Partly to save arithmetic and partly because of the greater homogeneity of farming type in Wales, the inquiry was confined to England, which, for the purposes of the Ministry's estimates, is divided into 48 crop counties. Apart from sugar-beet (which was excluded for reasons given below) the following ten crops are regularly recorded:

Wheat	Potatoes
Barley	Turnips and Swedes
Oats	Mangolds
Beans	Hay (Temporary grass)
Peas	Hay (Permanent grass)

For every possible pair from the above list the product-moment coefficient of correlation was computed between the 48 yields of one crop and the 48 yields of the other. In some counties certain crops occupy a very small proportion of the crop acreage, but it was decided not to adopt any criterion of rejection on that account. The calculations were carried out for each of four years, 1925, 1930, 1935 and 1936, the last being the latest year for which figures were available when the investigation was begun. The correlation coefficients obtained are shown in Tables 1-4.

3. These tables have several points of interest, but the outstanding feature is the fact that 168 of the 180 different correlation coefficients are positive. That is to say, a county which is good at producing one crop will, in general, be better than the average at producing any other. The strength of the correlation varies between different

TABLE 1

Coefficients of Correlation between the Crops Shown for 1925

	Wheat	Barley	Oats	Beans	Peas	Pota- toes	Turn- ips	Man- golds	Hay (Tem- porary Grass)	Hay (Per- manent Grass)
Wheat ...	—	·866	·822	·418	·324	·524	·490	·270	·298	·487
Barley ...	·866	—	·764	·360	·247	·468	·467	·256	·365	·488
Oats ...	·822	·764	—	·627	·483	·503	·381	·405	·256	·436
Beans ...	·418	·360	·627	—	·683	·318	·120	·281	·124	·236
Peas ...	·324	·247	·483	·683	—	·098	·041	·431	·011	·336
Potatoes ...	·524	·468	·503	·318	·098	—	·587	·200	·352	·334
Turnips ...	·490	·467	·381	·120	·041	·587	—	·611	·512	·670
Mangolds ...	·270	·256	·405	·281	·431	·200	·611	—	·119	·431
Hay (Tem- porary Grass) ...	·298	·365	·256	·124	·011	·352	·512	·119	—	·673
Hay (Per- manent Grass) ...	·487	·488	·436	·236	·336	·334	·670	·431	·673	—

TABLE 2

Coefficients of Correlation between the Crops Shown for 1930

	Wheat	Barley	Oats	Beans	Peas	Pota- toes	Turn- ips	Man- golds	Hay (Tem- porary Grass)	Hay (Per- manent Grass)
Wheat ...	—	·761	·443	·113	·262	·255	·115	·003	·335	·052
Barley ...	·761	—	·490	·035	·304	·104	·242	·036	·307	·019
Oats ...	·443	·490	—	·258	·124	·431	·385	·376	·388	·229
Beans ...	·113	·035	·258	—	·942	·018	·103	·447	·144	·461
Peas ...	·262	·304	·124	·942	—	·146	·565	·794	·157	·708
Potatoes ...	·255	·104	·431	·018	·146	—	·153	·491	·247	·195
Turnips ...	·115	·242	·385	·103	·565	·153	—	·382	·534	·418
Mangolds ...	·003	·036	·376	·447	·794	·491	·382	—	·398	·687
Hay (Tem- porary Grass) ...	·335	·307	·388	·144	·157	·247	·534	·398	—	·629
Hay (Per- manent Grass) ...	·052	·019	·229	·461	·708	·195	·418	·687	·629	—

TABLE 3

Coefficients of Correlation between the Crops Shown for 1935

	Wheat	Barley	Oats	Beans	Peas	Pota- toes	Turn- ips	Man- golds	Hay (Tem- porary Grass)	Hay (Per- manent Grass)
Wheat ...	—	·790	·872	·558	·354	·522	·224	·195	·355	·009
Barley ...	·790	—	·802	·509	·457	·382	·257	·336	·442	·101
Oats ...	·872	·802	—	·467	·304	·614	·163	·301	·317	·007
Beans ...	·558	·509	·467	—	·289	·116	·349	·141	·011	·178
Peas ...	·354	·457	·304	·289	—	·080	·012	·181	·003	·051
Potatoes ...	·522	·382	·614	·116	·080	—	·090	·015	·118	·043
Turnips ...	·224	·257	·163	·349	·012	·090	—	·368	·626	·519
Mangolds ...	·195	·336	·301	·141	·181	·015	·368	—	·574	·605
Hay (Tem- porary Grass) ...	·355	·442	·317	·011	·003	·118	·626	·574	—	·687
Hay (Per- manent Grass) ...	·009	·101	·007	·178	·051	·043	·519	·605	·687	—

TABLE 4

Coefficients of Correlation between the Crops Shown for 1936

	Wheat	Barley	Oats	Beans	Peas	Pota- toes	Turn- ips and Swedes	Man- golds	Hay (Tem- porary Grass)	Hay (Per- manent Grass)
Wheat ...	-									
Barley ...	-766	-								
Oats ...	-837	-821	-							
Beans ...	-167	-278	398	-						
Peas ...	-544	393	-325	284	-					
Potatoes ...	-215	-224	219	-604	144	-				
Turnips and Swedes	-289	221	205	-165	-131	611	-			
Mangolds	-305	132	447	-502	-619	116	250	-		
Hay (Tem- porary Grass)	-496	386	-139	110	-328	-670	-115	372	-	
Hay (Per- manent Grass)	244	-134	-208	664	332	625	-400	581	625	-

crops, as one would expect. That between wheat and barley is high, and so is that between turnips and clover hay: whereas the correlation between potatoes and peas is small. But the general effect is clear. Of the 12 negative coefficients only one is significant, the correlation between turnips and peas in 1930: and having regard to the fact that in two other years the correlation between these two crops is positive, I think we can dismiss this anomalous value as unimportant.

4. Four different years were taken because it was felt that the uneven incidence of weather on crop yields might make a single year's figures unreliable. It is not easy to pick four years which, taken together, can be regarded as average for all the meteorological circumstances affecting crop yields. 1925 was a moderate year for cereals and potatoes, rather below average for legumes and good for grass and roots. 1930 was moderate for most crops, good growing conditions being offset by rain at harvest. Legumes did fairly well and roots were slightly below average. 1935 was good for cereals. Potatoes and root crops were good but rather light owing to early drought. 1936 was a poor year, particularly for cereals and hay, but the quantity of the latter was fair.

The four years provide as varied a set of weather conditions as one would expect and it seems legitimate to infer that any phenomenon common to them all is independent of casual climatic influences. They also have the advantage of covering a fair interval of time. Since sugar-beet was not fully established in this country in the earlier years it was excluded from the investigation.

5. Tables 1-4, therefore, lend support to the suggestion that an area in England at the present time has some kind of inherent

capacity to produce good yields of a crop independently of which of the ten crops is grown. Of course this does not imply that any area will do equally well at every crop or that it is impossible to find an area with a high yield of one crop and a low yield of another. But it seems to me that on this evidence one may speak of the "productivity" of an area with genuine meaning, always bearing in mind that it is an extrapolation to use the word in relation to crops other than those specified.

"Productivity" is not a synonym for "fertility." I use the word to express the power of agriculture in a particular locality to produce crops without regard to whether that power is due to the bounty of nature or to the efforts of man. It will depend not only on the quality of the soil and the climate, but on such factors as farming efficiency, availability of labour, the supply of capital, and State encouragement.

6. It is as well to emphasize at the beginning that no account has been taken of fruit and vegetables or of grazing pastures. From some points of view, it might have been preferable to include fruit and vegetable growing in the inquiry, but for a discussion of crop productivity (meaning by "crop" one of the ten products previously mentioned) they are irrelevant. During the past fifty years British agriculture has tended to switch over to the production of physiologically protective foodstuffs, and there is no sign of any reversal of the trend. In obtaining a picture of existing crop productivity, therefore, one can safely disregard land under fruit and vegetables on the understanding that it is unlikely to revert to crop production for many years to come. Even in an intensive campaign which might be embarked on in an emergency it may be hazarded that orchards and vegetable areas would be disturbed as little as possible.

If any comparable estimates of yields on grazing pastures had been available I should have taken them into account. The recent interest in grass drying and the Government's campaign for improving soil fertility by encouraging the use of lime and basic slag may, in the course of time, furnish some data from which regional estimates could be attempted. But at present there are very few data and I have been able to take account of grassland productivity only through the inclusion of hay from permanent grass, which unfortunately makes allowance only for quantity.

7. These remarks are to be borne in mind in interpreting the results of the inquiry. For example, in a discussion of the comparative productivities of counties below, Worcestershire will appear as a county of low productivity, notwithstanding that it includes the Vale of Evesham, because the vale is mainly devoted to fruit and vegetable growing. Again, Leicestershire will appear as a poorly

productive area, because most of the best land in that county is grazed and the arable land is indifferent.

8. The main interest attaching to the idea of crop productivity lies in variation from place to place. No very clear impressions on this subject can be got from an inspection of the crop yields themselves, and the problem thus arises of constructing some kind of coefficient to measure the productivity on a local basis. I proceed to describe four different coefficients which were tried out for the purpose. The first two (the "productivity" and "ranking" coefficients) are based on psychological work, and measure a factor which may reasonably be regarded as covariant with productivity by regarding crop yields as analogous to test scores.* The third and fourth (the "money-value" and "energy" indices) are spatial index numbers obtained by expressing the yields in terms of common factors, money-value and energy content.

The Productivity Coefficient

9. The yields of the ten crops for a particular county may be regarded as the co-ordinates of a point in a 10-dimensional Cartesian space. The counties will then correspond to a swarm of 48 points in this space and the importance of an individual county will be represented by its position relative to the general constellation. If the correlations were all perfect the points would lie on a curve which would approximate to a straight line in virtue of the fact that crop yields are distributed in a nearly normal form. The order of the points on this line would enable us to rank the counties in order of productivity.

In practice, of course, the correlations are not perfect. I therefore attempted to determine the straight line of closest fit to the cluster and to rank the counties according to the order of their points of projection on to this line, which may be termed the "productivity axis."

10. Consider the general case of n crops and let the yields be denoted by $x_1 \dots x_n$. I assume the x 's to be expressed in standard measure about their respective means, *e.g.* if the yield of the first crop for a particular county is X_1 , then for that county

$$X_1 = \frac{x_1 - M_1}{\sigma_1} \dots \dots \dots (1)$$

where M_1 is the mean yield of that crop among all counties and σ_1 is its standard deviation. It is required to find the straight line of closest fit to a set of points represented by 48 sets of values of $x_1 \dots x_n$.

* This approach was suggested by a paper of Dr. Rhodes (1937), who appears to have been the first to contemplate the application of psychological methods to demographic statistics.

In accordance with the usual procedure in analogous cases I define the line of closest fit as the line such that the sum of squares of the distances of the points from it is a minimum.

Suppose the line is

$$\frac{\xi_1 - m_1}{l_1} = \frac{\xi_2 - m_2}{l_2} = \dots = \frac{\xi_n - m_n}{l_n} \quad . \quad . \quad (2)$$

when the ξ 's are current co-ordinates. Then D , the sum of the squares of the distances of the points from it, is given by

$$D = S \{ (x_1 - m_1)^2 + (x_2 - m_2)^2 + \dots + (x_n - m_n)^2 \} \\ - S \{ l_1(x_1 - m_1) + l_2(x_2 - m_2) + \dots + l_n(x_n - m_n) \}^2 \quad . \quad (3)$$

the summation extending over the 48 points.

This is stationary only if the partial derivatives with respect to the m 's vanish, i.e. if

$$S(x_1 - m_1) - S[l_1\{l_1(x_1 - m_1) + \dots + l_n(x_n - m_n)\}] = 0 \quad \text{etc.,} \quad . \quad . \quad . \quad (4)$$

Since $S(x_1) = 0$, etc., by hypothesis, equations (4) lead to

$$-\frac{m_1}{l_1} = -\frac{m_2}{l_2} = \dots = -\frac{m_n}{l_n}$$

and hence the origin lies on the line. We may thus take

$$m_1 = m_2 = \dots = m_n = 0.$$

A further condition that (3) gives a stationary value is that the partial derivatives with respect to the l 's shall be proportional to the l 's (since $l_1^2 + l_2^2 + \dots + l_n^2 = 1$). Hence we have

$$\left. \begin{aligned} & \frac{S\{x_1(l_1x_1 + l_2x_2 + \dots + l_nx_n)\}}{l_1} \\ & = \frac{S\{x_2(l_1x_1 + l_2x_2 + \dots + l_nx_n)\}}{l_2} \\ & = \text{etc.} \\ & = N\lambda \text{ (say).} \end{aligned} \right\} \quad . \quad . \quad . \quad (5)$$

Now $S(x_1^2) = S(x_2^2) = \dots = N$, the number of counties, and the cross products $S(x_1x_2) = Nr_{12}$, etc., r_{12} being the coefficient of correlation between x_1 and x_2 . Thus (5) reduces to the equations

$$\left. \begin{aligned} & l_1(1 - \lambda) + l_2r_{12} + \dots + l_nr_{1n} = 0 \\ & l_1r_{21} + l_2(1 - \lambda) + \dots + l_nr_{2n} = 0 \\ & \vdots \\ & l_1r_{n1} + l_2r_{n2} + \dots + l_n(1 - \lambda) = 0 \end{aligned} \right\} \quad . \quad . \quad (6)$$

Giving for λ the n-ic

$$\begin{vmatrix} 1 - \lambda & r_{12} & \dots & r_{1n} \\ r_{12} & 1 - \lambda & \dots & r_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ r_{1n} & r_{2n} & \dots & 1 - \lambda \end{vmatrix} = 0 \quad . \quad . \quad . \quad (7)$$

The n roots of this equation give n stationary values of D . The *minimum* value of D is given by the greatest value of λ . For, from (3)

$$D = S(x_1^2 + x_2^2 + \dots + x_n^2) - S\{l_1x_1 + l_2x_2 + \dots + l_nx_n\}^2$$

and the second part on the right is seen from (5) to be equal to $N\lambda$. Thus D is a minimum when λ is a maximum.

11. To find the productivity axis it is therefore necessary to solve (7) for the greatest root of λ . The direction cosines of the axis may then be derived from $n - 1$ of the equations (6) and the equation $l_1^2 + l_2^2 + \dots + l_n^2 = 1$. The points may then be projected on to the axis by equations of the type

$$p = l_1x_1 + l_2x_2 + \dots + l_nx_n \quad \dots \quad (8)$$

and it is possible to rank the counties in order according to the values of p , which I therefore call the *productivity coefficient*. A county with high yields will lie high up along the axis, one with low yields low down on the axis, and counties with moderate yields or with a mixture of high and low yields will occupy intermediate positions. The value of p may therefore be expected to provide a measure of productivity, so far as measurement within the compass of a single number is possible.

12. The problem just considered and the associated determinant (7) occur in a wide variety of mathematical contexts, from the factor theory of intelligence to the quantum theory. In essence the question is one of determining the principal axes of an ellipsoid in an n -dimensional flat space.* Methods have been suggested by various psychological writers for obtaining an approximate solution of equation (7) or for arriving at the quantities p of equation (8) by short cuts. But I know of no method which is unattended by great arithmetical labour in the 10-dimensional case and I should have been repelled from the calculations if I had not been fortunate enough to be able to use the Mallock Calculating Machine. This machine (described by Mr. Mallock in the *Proceedings of the Royal Society* (1933) and in *Engineering* (1934)) will obtain the roots of a set of 10 linear equations and by a simple method of trial and error the values of λ may be quickly found. In the process of finding λ the direction cosines are given directly by the machine. The machine has been purchased by Cambridge University and is now in the newly formed Mathematical Laboratory, under the custody of Professor J. E. Lennard-Jones, by whose courtesy the necessary solutions were obtained for each of the four years for which the

* In this form the problem goes back for many years. The problem of fitting lines and planes to point clusters was discussed by Karl Pearson (1901). Greenwood and Yule (1915) have used the method of principal axes for the two-dimensional case.

correlation coefficients are given in Tables 1-4. From the values of the V 's the productivity coefficients were calculated and are given in Table 5.

A discussion of the results is given below (paragraphs 25-33). There is no obvious limit to the absolute value of coefficients ob-

TABLE 5
Values of the Productivity Coefficient for the Years Shown

County	1925	1930	1935	1936
(1) Bedford	-2.679	+ .333	-1.591	- .656
(2) Berkshire	+ .054	- .469	-2.193	-1.860
(3) Buckingham	+ .347	+2.237	- .558	+ .595
(4) Cambridge	-1.929	- .649	-3.065	-1.279
(5) Chester	+3.974	+1.243	+ .982	+2.727
(6) Cornwall	+1.380	+2.794	+ .926	+ .584
(7) Cumberland	-2.090	-4.384	+ .202	- .565
(8) Derby	+ .175	-1.130	+ .636	+ .606
(9) Devon	-1.030	+ .017	- .200	- .826
(10) Dorset	- .507	+ .571	- .070	-2.265
(11) Durham	- .184	-1.253	+ .044	+ .438
(12) Essex	+ .326	+1.747	+ .380	+1.528
(13) Gloucester	- .740	+1.303	-1.828	- .898
(14) Hampshire	-1.249	-1.496	-1.542	-2.794
(15) Hereford	-1.339	-1.843	-1.468	-1.782
(16) Hertford	-1.874	- .437	-1.294	+ .241
(17) Huntingdon	+1.231	-3.376	-2.163	-2.867
(18) Isle of Ely	+7.868	+5.801	+6.271	+5.527
(19) Isle of Wight	-3.651	-4.874	-5.045	-4.321
(20) Kent	+1.361	+1.704	+3.240	+1.369
(21) Lancaster	+ .963	+ .940	+1.925	+3.551
(22) Leicester	-1.424	-1.080	+ .086	-1.159
(23) Lincs. (Holland)	+7.235	+4.953	+7.811	+6.701
(24) Lincs. (Kesteven)	+1.532	+ .182	- .406	-1.903
(25) Lincs. (Lindsey)	+ .315	- .373	+ .734	- .374
(26) Middlesex and London	-1.121	+1.388	+ .530	+ .107
(27) Norfolk	+2.754	- .273	+ .623	+1.048
(28) Northampton	-4.448	- .251	+ .186	- .952
(29) Northumberland	+ .429	- .841	+1.641	+1.907
(30) Nottingham	-1.459	- .967	- .826	-1.657
(31) Oxford	- .697	+ .057	- .953	+ .232
(32) Rutland	-2.388	-2.846	- .956	+ .027
(33) Salop	- .473	- .118	+ .247	+1.490
(34) Soke of Peterborough	+1.144	- .959	- .756	-1.311
(35) Somerset	+ .670	+1.361	+ .994	- .182
(36) Stafford	+ .543	+ .063	+1.327	+1.486
(37) Suffolk, E.	+ .230	- .206	+1.103	+2.328
(38) Suffolk, W.	- .113	- .889	- .686	+ .468
(39) Surrey	-2.796	+ .346	- .781	-2.042
(40) Sussex, E.	-2.373	+1.586	-1.287	-1.177
(41) Sussex, W.	-2.146	-2.154	-1.051	-3.784
(42) Warwick	- .503	- .384	-1.009	- .437
(43) Westmorland	-2.302	-4.067	+ .105	-4.333
(44) Wiltshire	+1.393	+2.887	- .018	+ .369
(45) Worcester	-2.408	- .555	-1.820	-1.135
(46) Yorks. E.R.	+1.856	-1.005	- .716	- .485
(47) Yorks. N.R.	- .376	- .467	+1.244	+ .940
(48) Yorks. W.R.	-1.138	- .227	+ .842	+ .492

tained in this way but in practice values greater than $3\sqrt{n}$ are very improbable.*

The Ranking Coefficient

13. The labour required to reach Table 5 prompted me to look for a coefficient which, though perhaps of doubtful theoretical meaning, might lead to similar results in practice and save a good deal of the calculation. The following process was selected:

For each of the ten crops the 48 counties were ranked in the order of yield, beginning at the highest yield; *e.g.* in 1925 Buckinghamshire had rankings of 32 for wheat, 30 for barley, 32 for oats, 11 for beans, 4 for peas, 12 for potatoes, 16 for turnips, 11 for mangolds, 19 for hay (temporary grass) and 40 for hay (permanent grass). These ranks were considered as cardinal numbers and their arithmetic mean obtained; *e.g.* for Buckinghamshire in 1925 the figure obtained would be 20.7. This mean I call a *ranking coefficient*. The ranks of counties which had equal yields were allotted by splitting in the usual way, *i.e.* if the r th, $(r+1)$ th . . . $(r+s)$ th counties had equal yields, each was allotted a rank $\{r + (r+1) + \dots + (r+s)\}/(s+1)$ and the next county was ranked as $(r+s+1)$. It might have been possible to evade the difficulty by working out the crop yields to further places of decimals than those published in the Agricultural Statistics, but the accuracy of the estimates does not justify more than one place of decimals and in any case I do not think the procedure adopted results in any material differences in the values of the ranking coefficient. From the theoretical standpoint the problem of split ranks remains obscure, but trouble arises mainly in testing the significance of sampling results, not in the type of descriptive work considered on the present occasion.

It is clear that a county with relatively high yields will have low ranking, and thus a low ranking coefficient; and vice versa. The ranking coefficient may thus be expected to give some sort of guide to the relative importance of counties. It may take any value from 1 to 48 and in practice comes very near to those limits for some counties.

Table 6 gives the values of this coefficient for the four years already considered. The results are discussed below (paragraphs 25-33).

* For, if N be the number of counties

$$\begin{aligned} S(p^2) &= S(l_1x_1 + \dots + l_nx_n)^2 \\ &= N\{1 + 2(l_1l_2x_{12} + \dots)\} \\ &\leq N\{1 + 2(l_1l_2 + \dots)\} \\ &\leq N(l_1 + \dots + l_n)^2 \\ &\leq Nn \\ \sigma_p &\leq \sqrt{n} \end{aligned}$$

So that

For correlational matrices in which the coefficients are materially less than unity the probable limits to p are narrower.

TABLE 6

Value of the Ranking Coefficient for the Years Shown

County	1925	1930	1935	1936
(1) Bedford ...	37.30	23.05	31.50	28.25
(2) Berkshire ...	22.10	27.45	36.40	33.40
(3) Buckingham ...	20.70	13.85	24.65	19.20
(4) Cambridge ...	34.25	29.60	38.95	25.65
(5) Chester ...	9.25	18.50	19.55	12.60
(6) Cornwall ...	17.80	14.80	20.45	21.90
(7) Cumberland ...	24.20(b)	29.61(b)	16.67(b)	20.17(b)
(8) Derby ...	22.15	31.15	18.85	20.55
(9) Devon ...	30.80	25.65	24.20	29.10
(10) Dorset ...	26.80	20.60	20.45	31.90
(11) Durham ...	24.40	29.60	23.70	21.00
(12) Essex ...	20.55	14.35	21.25	15.35
(13) Gloucester ...	27.50	22.10	32.05	27.85
(14) Hampshire ...	30.40	33.65	30.45	34.80
(15) Hereford ...	30.30	34.00	32.55	32.60
(16) Hertford ...	33.75	26.70	30.90	22.60
(17) Huntingdon ...	17.60	41.25	35.50	35.35
(18) Isle of Ely ...	4.45	5.00	6.25	8.90
(19) Isle of Wight ...	39.10	41.15	46.50	41.25
(20) Kent ...	18.15	13.80	12.20	18.70
(21) Lancaster ...	20.00	17.50	15.45	12.20
(22) Leicester ...	32.80	30.60	23.35	30.65
(23) Lincs. (Holland) ...	2.05	4.90	3.60	6.00
(24) Lincs. (Kesteven) ...	15.75	22.65	27.30	34.30
(25) Lincs. (Lindsey) ...	20.30	25.60	20.50	26.75
(26) Middlesex and London ...	27.50	17.20	20.90	17.28(a)
(27) Norfolk ...	12.25	25.55	23.75	17.80
(28) Northampton ...	26.85	25.30	21.30	30.65
(29) Northumberland ...	21.30	24.95	16.00	15.90
(30) Nottingham ...	31.25	30.05	27.10	33.20
(31) Oxford ...	26.25	25.30	27.65	19.65
(32) Rutland ...	33.45	34.50	28.55	21.45
(33) Salop ...	25.50	24.55	22.45	14.60
(34) Soke of Peterborough ...	17.60	28.85	28.60	31.50
(35) Somerset ...	19.85	18.00	18.70	25.35
(36) Stafford ...	20.45	21.10	17.80	14.35
(37) Suffolk, E. ...	22.45	24.35	16.15	11.45
(38) Suffolk, W. ...	24.15	29.90	28.00	22.20
(39) Surrey ...	37.85	21.25	26.80	34.35
(40) Sussex, E. ...	34.70	17.30	31.45	32.30
(41) Sussex, W. ...	34.30	30.40	30.95	42.95
(42) Warwick ...	25.75	27.20	30.30	26.85
(43) Westmorland ...	27.06(c)	28.00(c)	24.10	28.06(c)
(44) Wiltshire ...	15.60	14.95	23.45	21.40
(45) Worcester ...	34.30	28.65	35.10	29.70
(46) Yorks. E.R. ...	14.10	29.55	26.75	26.10
(47) Yorks. N.R. ...	25.55	26.05	15.40	17.90
(48) Yorks. W.R. ...	31.10	22.20	18.40	20.45

(a) No peas. Figure given is average for 9 crops. Average for 10 crops, ranking peas at 48 is 20.35.

(b) No peas. Figure given is average for 9 crops. Average for 10 crops (ranking peas at 48) is:

1925 ... 26.60 1930 ... 31.45 1935 ... 19.80 1936 ... 22.95

(c) No peas in 1925 or 1930 and no beans or peas in 1936. Figure given is average of 9 crops in 1925 and 1930 and average of 8 crops in 1936. Averages of 10 crops in 1925 and 1930, ranking peas as 48, are 29.15 and 30.00 respectively. Average for 10 crops in 1936, ranking beans and peas as 47½ each, is 31.95.

The Money-Value Coefficient

14. The two foregoing coefficients are concerned only with the yields per acre and are not in any way weighted according to the volume of production. Consideration was therefore given to the possibility of evolving measures of crop productivity by recourse to the index-number technique. The principal difficulty is to express yields of different crops in terms of some common unit. There is no quantity in this case which is completely satisfactory. There are two, however, which offered reasonable promise, namely, money value (as expressed in price) and energy (as expressed in starch equivalent).

15. A money-value index is subject to the disability that for certain crops adequate prices are not available—in fact, do not exist. Wheat gives the best price material since nearly all wheat grown in England is marketed under the stimulus of the Wheat Act, and very representative prices for the country as a whole are available. At the other end of the scale we have beans and turnips, most of which are grown for consumption on the farm, and price data for which are very inadequate. In the circumstances I was often compelled to use figures which can only be approximate, on the grounds that nothing better was to be had. As the data employed may be of general interest, they are given in full in Table 7, together with some notes on the methods by which they were obtained.

16. The next question for decision was whether the index for a particular area was to be calculated only from prices ruling in that area. The answer was found to be determined by the purely practical circumstance that no county prices were available. But even if they had been it would still have been arguable whether they should have been used to bring the crop outputs to a common denominator. Crops are frequently not sold in the county of origin. Furthermore, local variations in price depend in many instances as much on circumstances like proximity to markets as on quality or relative nutritive character and it is no part of the function of the index to measure the former class of price element.

17. The prices for the different crops were obtained for the twelve years 1925–36 inclusive and averaged, the results being given in Table 8.

It is evident that the big differences in prices per cwt. between the crops will weight the final result heavily in favour of the higher-priced commodities. On the basis of the prices of Table 8 the crop production of each county was valued by multiplying the volume of production of a particular crop by the price and adding the results for the ten crops together. The total, divided by the total acreage

TABLE 7
Prices of Certain Crops for the Years Shown
 (Shillings per ton)

	1925		1926		1927		1928		1929		1930	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Wheat (a) ...	243	4	248	4	230	0	200	0	196	8	160	0
Barley (a) ...	235	0	206	8	235	0	220	0	198	4	158	4
Oats (a) ...	195	0	180	0	181	8	208	4	176	8	123	4
Beans (b) ...	208	4	196	8	193	4	213	4	216	8	161	8
Peas (c) ...	385	6	223	6	315	6	333	0	291	3	255	0
Potatoes (d) ...	160	3	120	7½	137	9	136	7½	92	10½	80	1½
Turnips and Swedes (e) ...	14	6	13	6	15	6	15	6	14	6	8	6
Mangolds (f) ...	16	0	16	0	18	0	17	0	16	0	10	0
Hay (Temporary) (g) ...	99	3	103	3	108	0	113	3	123	9	115	3
Hay (Permanent) (g) ...	87	3	92	9	92	3	98	3	110	0	102	0

	1931		1932		1933		1934		1935		1936	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Wheat (a) ...	115	0	118	4	106	8	96	8	103	4	143	4
Barley (a) ...	158	4	151	8	158	4	173	4	158	4	165	0
Oats (a) ...	125	0	140	0	111	8	125	0	133	4	126	8
Beans (b) ...	123	4	128	4	120	0	125	0	128	4	126	8
Peas (c) ...	245	6	233	0	256	6	233	9	259	6	214	0
Potatoes (d) ...	151	1½	155	3	82	4½	93	6	105	6	145	6
Turnips and Swedes (e) ...	8	0	9	6	8	0	11	0	8	0	10	0
Mangolds (f) ...	9	0	11	0	10	0	14	0	10	0	13	0
Hay (Temporary) (g) ...	83	9	69	3	74	9	97	9	102	6	96	0
Hay (Permanent) (g) ...	74	0	60	0	60	0	76	3	84	0	71	9

(a) *Agric. Stats.* Annual average price. Prices ascertained under Corn Returns Act, 1882, and Corn Sales Act, 1921.

(b) *Agric. Stats.* English winter beans, feeding-stuffs price at Hull only. From 1925 to 1929 inclusive 6d. per cwt. has been added for delivery charge.

(c) *Agric. Stats.* and *Journal of Ministry of Agriculture and Fisheries.* Mean of annual average of market garden peas (average 1st and 2nd quality) and feeding-stuffs price in annual table of farm values of feeding-stuffs.

(d) *Agric. Stats.* Mean of 1st- and 2nd-quality King Edward VII and Majestic and mean of resulting figures.

(e) *Journal of Ministry of Agriculture and Fisheries.* Mean of feeding-stuffs prices in annual table of farm values of feeding-stuffs.

(f) *Journal of Ministry of Agriculture and Fisheries.* Feeding-stuffs price in annual table of farm values of feeding-stuffs.

(g) *Agric. Stats.* Mean of annual average of 1st and 2nd quality.

in the county *under the ten crops*, gives for each county a figure of money value per acre under the crops considered. The calculations were, as usual, carried out for all counties for each of the four years

TABLE 8

Average of 1925 to 1936 Prices for the Crops Shown (cf. Table 7)

					Shillings per Ton.
Wheat	...	...	...	...	163.47
Barley	...	...	...	...	184.86
Oats	...	...	...	...	152.22
Beans	...	...	...	...	161.81
Peas	...	...	...	...	270.50
Potatoes	...	...	...	...	121.79
Turnips and Swedes	...	...	...	...	11.38
Mangolds	...	...	...	...	13.33
Hay (Temporary)	...	...	...	...	98.90
Hay (Permanent)	...	...	...	...	84.04

1925, 1930, 1935 and 1936. The resulting figures are given in Table 9. The large differences between counties such as Ely and Westmorland are an interesting illustration of the diverse financial circumstances obtaining in English farming to-day.

18. The method of calculation of an index number depends largely on the use to which the resulting figure is to be put. Since the purpose of the money-value index is only to compare the productivity of different areas, independently of fluctuations in prices from year to year and of special price-determining factors such as proximity to market, the index proposed seems reasonably adequate. But I should like to emphasize that the figures of Table 9 are not to be misinterpreted as measuring the actual gross income per acre, still less the profitability of crop farming in particular areas. In ordinary circumstances it would be unnecessary to labour this point. The words "money value" and "price," however, have such emotional associations in the agricultural mind that some specific disclaimer is desirable.*

The Energy Coefficient

19. Like the money-value index, an index based on nutritional factors has to ignore local variations because of the absence of data. Certain other theoretical considerations have also to be set on one side for practical reasons. It is, for instance, impossible to take any account of protective elements in the crops, although these may exercise an important effect on the growth and well-being of the creature to which they are fed. Similarly, the necessity of selecting a common unit entails that account cannot be simultaneously taken of energy-providing carbohydrates and body-building proteins (except, of course, to the extent that allowance may always be made for the starch equivalent of proteins). For the present

* It is irrelevant to the present paper, but nevertheless a notable fact, that the areas with high money-value indices are on the whole areas wherein the financial conditions are generally regarded as satisfactory.

TABLE 9

*Values of the Money-Value Coefficient in Shillings per Acre for
the Years Shown*

County	1925	1930	1935	1936
(1) Bedford	157.1	155.5	138.8	156.1
(2) Berkshire	128.8	117.0	109.8	104.0
(3) Buckingham	117.2	128.3	116.8	111.4
(4) Cambridge	141.8	132.7	119.0	133.9
(5) Chester	210.2	182.7	173.9	182.0
(6) Cornwall	154.4	144.1	129.9	129.2
(7) Cumberland	137.0	131.2	135.3	125.1
(8) Derby	124.7	116.9	119.8	119.2
(9) Devon	137.7	134.2	129.0	117.4
(10) Dorset	116.7	120.2	121.1	101.5
(11) Durham	147.0	137.4	143.3	149.1
(12) Essex	153.6	151.2	148.4	150.0
(13) Gloucester	123.4	121.3	108.4	108.8
(14) Hampshire	129.3	122.1	117.8	108.0
(15) Hereford	118.3	107.9	104.1	99.9
(16) Hertford	135.2	129.3	130.8	129.9
(17) Huntingdon	201.1	143.4	173.6	169.7
(18) Isle of Ely	347.7	302.5	395.7	310.7
(19) Isle of Wight	113.2	96.4	92.7	110.2
(20) Kent	167.2	156.5	154.6	153.8
(21) Lancaster	205.3	189.3	199.8	199.7
(22) Leicester	115.2	112.4	107.7	106.3
(23) Lincs. (Holland)	401.0	378.3	413.2	352.5
(24) Lincs. (Kesteven)	183.0	169.5	175.3	159.1
(25) Lincs. (Lindsey)	172.5	168.3	185.2	169.9
(26) Middlesex and London	145.5	156.4	159.4	167.4
(27) Norfolk	177.4	155.0	173.2	176.2
(28) Northampton	123.7	117.6	118.1	107.2
(29) Northumberland	138.4	129.9	143.0	141.2
(30) Nottingham	138.5	133.5	129.9	125.6
(31) Oxford	125.1	122.0	116.5	116.3
(32) Rutland	109.3	103.2	109.3	121.2
(33) Salop	130.9	124.8	120.1	123.7
(34) Soke of Peterborough	189.1	150.8	158.5	151.6
(35) Somerset	121.0	122.4	125.4	107.4
(36) Stafford	158.9	152.3	145.1	149.0
(37) Suffolk, E.	149.1	135.8	150.2	151.7
(38) Suffolk, W.	146.0	127.8	138.9	140.5
(39) Surrey	129.7	128.7	127.6	112.7
(40) Sussex, E.	105.7	123.3	95.7	98.4
(41) Sussex, W.	124.8	115.0	110.6	98.3
(42) Warwick	136.5	124.3	116.4	115.6
(43) Westmorland	104.7	97.3	94.2	91.0
(44) Wiltshire	131.1	128.4	123.4	113.5
(45) Worcester	123.4	130.3	107.4	115.0
(46) Yorks. E.R.	164.4	139.9	136.0	143.4
(47) Yorks. N.R.	140.3	133.1	136.8	138.0
(48) Yorks. W.R.	139.2	144.7	142.9	142.9

purpose starch equivalent was obviously the most suitable unit to take.

20. To calculate a coefficient based on starch equivalent it is necessary to decide :

(a) whether a gross or net digestible energy figure is to be taken;

(b) whether any allowance is to be made for by-products such as wheat straw and turnips tops;

(c) whether account need be taken of the fact that the energy in certain foods, such as hay, cannot be absorbed directly by the human stomach, but has to be fed in the first instance to livestock, with a consequent loss.

21. The Bulletin of the Ministry of Agriculture entitled *Rations for Livestock* gives figures for the gross and net starch equivalents of the various crops considered in this paper. Net energy is the amount of energy available for work and body building, whereas a gross figure includes the energy employed in the digestive processes of the consuming animal and similar non-realizable forms. Inasmuch as the present inquiry was concerned with the *production* of energy I worked with gross figures, which are given in Table 10.

TABLE 10

*Energy Values of Various Arable Crops**Gross Digestible Energy as Starch*

						Per cent.
Wheat	...	...	...	...	...	79.1
Barley	...	...	...	...	...	75.3
Oats ...	...	...	...	...	...	66.1
Beans	...	...	...	...	...	76.5
Peas ...	...	...	...	...	...	77.3
Potatoes	...	...	...	...	...	18.8
Mangolds	...	...	...	...	...	9.2 (a)
Turnips	...	...	...	...	...	9.2
Swedes	...	...	...	...	...	6.0
Hay (Temporary)	...	...	...	...	...	48.6 (b)
Hay (Permanent)	...	...	...	...	...	48.1 (c)

(a) Average of white-fleshed globe and yellow-fleshed globe or tankard (the most common types on farms).

(b) Hay (temporary) is taken to mean a mixture of clover (crimson; and red, damaged, poor, good and very good); lucerne (before flowering, in full flower and half flower); sainfoin (in flower and before flowering). A mixture of rye grass and clover, rye grass (before flowering, perennial and Italian); timothy and trefoil. If rye grass and clover only were included the figure would be 51.3.

(c) Simple average of poor, good and very good.

Source—*Rations for Livestock*, Ministry of Agriculture and Fisheries Bulletin No. 48. Ninth edition.

22. The money-value coefficient takes no cognizance of the value of by-products of the crops; but a parallel omission of any allowance for the energy of the by-products in the energy coefficient would have a serious effect. There is nearly as much starch equivalent in the straw produced on an acre of wheat as in the grain itself. It was therefore necessary to estimate the proportion by weight of by-

products to main products for wheat, barley, oats, beans, peas, and turnips and swedes. The by-products of potatoes and mangolds are negligible and do not exist at all for the two kinds of hay. The figures adopted, together with some notes on the sources of the estimates, are given in Table 11.

TABLE 11

Estimated Proportion of By-products of Certain Arable Crops

Product					Weight of By-product per Acre (cwt.s.)
Wheat	...	...	...	...	29 (a)
Barley	...	...	...	...	23 (b)
Oats	...	...	...	...	27 (c)
Beans	...	...	...	...	25 (d)
Peas	...	...	...	...	25 (e)
Turnips and Swedes	...	...	...	...	51 (f)
Mangolds	...	...	...	...	80 (g)

Notes

(a) Assuming proportion of 33% grain to 67% straw and chaff.

(b) " " 42% " 58% " "

(c) " " 37% " 63% " "

(d) " " 40% " 60% straw.

(e) " " 43% " 57% straw and pods.

(f) " " 80% roots to 20% tops (turnips).

(g) " " 86% " 14% " (swedes).

(g) " " 85% " 15% "

These figures are based on *The Agricultural Notebook*, by Primrose McConnell. Eleventh edition.

On the basis of these figures we get the energy ratios (as gross digestible starch equivalent) shown in Table 12.

TABLE 12

Total Energy Values of Various Arable Crops

Gross Digestible Energy expressed as Starch—after adding the proportions assignable to by-products

					Per cent.
Wheat	...	...	...	...	147.1
Barley	...	...	...	...	134.8
Oats	...	...	...	...	136.1
Beans	...	...	...	...	142.4
Peas	...	...	...	...	128.5
Potatoes	...	...	...	...	18.8 (a)
Turnips and Swedes	...	...	...	...	8.7 (b)
Mangolds	...	...	...	...	10.2 (c)
Hay (Temporary)	...	...	...	...	48.6 (d)
Hay (Permanent)	...	...	...	...	48.1 (e)

(a) Potato haulms have been ignored.

(b) Average of two crops—both roots and tops.

(c) Average of white-fleshed globe and yellow-fleshed globe.

(d) See footnote (b) to Table 10.

(e) See footnote (c) to Table 10.

For example, a hundredweight of wheat will, when allowance is made for the associated straw, yield about 1.471 cwts. of starch equivalent. It is clearly irrelevant to the inquiry to make allowance for wastage after harvest or losses in keeping.

23. The energy shown in these tables is produced in the crop but it is not available for use by the human body. The energy in hay, for example, can be absorbed only by ruminants and consumed by man in the form of meat or milk. Now the animal is a very inefficient converter of energy, the most efficient beast, such as the cow or the pig, salvaging for the human stomach less than 20 per cent. of the energy fed to it. It might have been argued that an index expressed in terms of energy should make allowance for this fact, and should give only the energy available for human food, not the total energy produced. I rejected a procedure of this kind, not without reluctance, on several grounds: partly because the object of the inquiry is to compare productivity in general, not the production of types of food specially suited to human metabolism: partly because certain foods, such as English wheat, are mainly fed to livestock but could, if necessary, be consumed directly by human beings; and partly because it would be almost impossible to estimate with the requisite accuracy how much of the different crops in different areas are fed to the different types of stock.

24. The energy index was therefore constructed by ascertaining the production of energy per acre under crops on the basis of the data of Table 12. The figures are given in Table 13.

Discussion of Results

25. In order not to put too great a strain on the four coefficients just described I used them in the first instance only to divide the counties into four categories, good, moderate, indifferent and poor. This was done by dividing the counties into equal ranges determined by the median and the two quartiles, the number of counties fortunately being a multiple of four. Table 14 summarizes the results for the four coefficients for each of the four years considered. The letters A, B, C, D mean respectively that the county concerned falls above the upper quartile, between the upper quartile and the median, between the median and the lower quartile, and below the lower quartile. In one or two instances two counties tied on a line of division, in which case they were given the benefit of the doubt and both assigned to the upper class. This accounts for the fact that two of the columns contain thirteen of one letter and eleven of another.

A casual glance at the table will show that the verdicts of the money-value index and the energy index in the same year are very

TABLE 13

Values of the Energy Coefficient in Tons of Starch Equivalent per Acre for the Years Shown

County	1925	1930	1935	1936
(1) Bedford	·855	·868	·811	·825
(2) Berkshire	·874	·785	·742	·694
(3) Buckingham	·768	·807	·736	·704
(4) Cambridge	·981	·921	·856	·955
(5) Chester	·969	·886	·843	·852
(6) Cornwall	·956	·896	·795	·776
(7) Cumberland	·789	·793	·803	·742
(8) Derby	·768	·703	·740	·724
(9) Devon	·869	·847	·829	·746
(10) Dorset	·786	·775	·770	·639
(11) Durham	·780	·734	·764	·775
(12) Essex	·975	·943	·944	·942
(13) Gloucester	·781	·755	·685	·678
(14) Hampshire	·865	·801	·772	·702
(15) Hereford	·768	·690	·693	·653
(16) Hertford	·894	·851	·886	·858
(17) Huntingdon	1·097	·791	·905	·884
(18) Isle of Ely	1·491	1·235	1·514	1·268
(19) Isle of Wight	·758	·633	·574	·653
(20) Kent	·922	·857	·857	·800
(21) Lancaster	·872	·846	·885	·863
(22) Leicester	·731	·690	·683	·663
(23) Lincs. (Holland)	1·389	1·243	1·403	1·219
(24) Lincs. (Kesteven)	1·073	·952	·986	·899
(25) Lincs. (Lindsey)	·997	·948	1·031	·941
(26) Middlesex and London	·654	·718	·718	·704
(27) Norfolk	1·147	·970	1·083	1·093
(28) Northampton	·827	·775	·798	·717
(29) Northumberland	·818	·769	·858	·842
(30) Nottingham	·856	·819	·844	·803
(31) Oxford	·837	·813	·794	·773
(32) Rutland	·736	·701	·761	·806
(33) Salop	·802	·756	·756	·766
(34) Soke of Peterborough	1·100	·897	·932	·883
(35) Somerset	·753	·747	·769	·657
(36) Stafford	·842	·801	·787	·791
(37) Suffolk, E.	1·068	·963	1·085	1·088
(38) Suffolk, W.	1·031	·903	1·002	1·006
(39) Surrey	·720	·732	·719	·639
(40) Sussex, E.	·665	·764	·602	·605
(41) Sussex, W.	·845	·762	·737	·643
(42) Warwick	·781	·727	·703	·682
(43) Westmorland	·610	·590	·568	·548
(44) Wiltshire	·862	·817	·793	·722
(45) Worcester	·695	·743	·635	·663
(46) Yorks. E.R.	1·072	·930	·939	·977
(47) Yorks. N.R.	·838	·805	·842	·840
(48) Yorks. W.R.	·767	·784	·784	·773

close, as also are those of the productivity index and the ranking index; but the two former are not always in agreement with the two latter.

TABLE 14

*Summary of Classification of Counties into Four Categories
According to the Four Coefficients*

County	Prod. Method				Rank Method				Price Method				Energy Method			
	'25	'30	'35	'36	'25	'30	'35	'36	'25	'30	'35	'36	'25	'30	'35	'36
(1) Bedford ...	D	B	D	C	D	B	D	C	B	A	B	A	B	B	B	B
(2) Berkshire ...	B	C	D	D	B	C	D	D	C	D	D	D	D	B	C	C
(3) Buckingham ...	B	A	C	B	B	A	C	B	D	C	C	C	C	D	B	D
(4) Cambridge ...	D	C	D	C	D	C	D	C	B	B	C	C	B	A	B	A
(5) Chester ...	A	A	A	A	A	A	B	A	A	A	A	A	A	B	B	B
(6) Cornwall ...	A	A	A	B	A	A	B	B	B	B	B	B	B	B	A	B
(7) Cumberland ...	D	D	B	C	B	D	A	B	C	B	B	B	C	C	B	C
(8) Derby ...	C	D	B	B	B	D	A	B	C	D	C	C	C	D	D	C
(9) Devon ...	C	B	C	C	C	C	C	C	C	B	C	C	B	B	B	C
(10) Dorset ...	C	B	C	D	C	B	B	D	D	D	C	C	D	C	C	D
(11) Durham ...	B	D	B	B	B	C	B	R	B	B	B	B	B	C	D	C
(12) Essex ...	B	A	B	A	B	A	B	A	B	A	B	B	A	C	A	A
(13) Gloucester ...	C	A	D	C	C	B	D	C	D	D	D	D	D	C	C	D
(14) Hampshire ...	C	D	D	D	C	D	D	D	C	C	C	C	D	B	C	C
(15) Hereford ...	C	D	D	D	C	D	D	D	D	D	D	D	D	C	B	D
(16) Hertford ...	D	C	D	B	D	C	D	B	C	C	C	B	B	B	A	B
(17) Huntingdon ...	A	D	D	D	A	D	D	D	A	B	A	A	A	A	C	A
(18) Isle of Ely ...	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
(19) Isle of Wight ...	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
(20) Kent ...	A	A	A	A	A	A	A	B	A	A	A	A	A	B	B	B
(21) Lancaster ...	A	B	A	A	B	A	A	A	A	A	A	A	A	B	B	B
(22) Leicester ...	C	D	B	C	D	D	B	C	D	D	D	D	D	D	D	D
(23) Lines, (Holland) ...	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
(24) Lines, (Kesteven) ...	A	B	C	D	A	B	C	D	A	A	A	A	A	A	A	A
(25) Lines, (Lindsey) ...	B	C	B	C	B	C	B	C	A	A	A	A	A	A	A	A
(26) Middlesex and London ...	C	A	B	B	C	A	B	A	B	A	A	A	A	D	D	C
(27) Norfolk ...	A	B	B	A	A	C	B	A	A	A	A	A	A	A	A	A
(28) Northampton ...	D	C	B	C	C	B	B	C	A	D	D	C	D	C	C	C
(29) Northumberland ...	B	C	A	A	B	B	A	C	B	C	C	B	B	C	C	B
(30) Nottingham ...	C	C	C	D	D	D	C	D	B	R	C	C	C	R	B	B
(31) Oxford ...	C	B	C	B	C	B	C	B	C	D	D	C	C	B	B	C
(32) Rutland ...	D	D	C	B	D	D	C	B	D	D	D	D	C	D	D	C
(33) Salop ...	C	B	B	A	C	B	B	A	C	C	C	C	C	C	C	C
(34) Soke of Peterboro' ...	A	C	C	D	A	C	C	D	A	B	A	D	B	A	A	A
(35) Somerset ...	B	A	A	B	A	A	A	C	D	C	C	C	D	D	D	C
(36) Stafford ...	B	B	A	A	B	B	A	A	A	B	A	B	B	C	B	A
(37) Suffolk, E. ...	B	B	A	A	B	B	A	A	B	B	A	A	A	A	A	A
(38) Suffolk, W. ...	B	B	C	O	B	B	D	C	B	R	C	B	B	A	A	A
(39) Surrey ...	D	B	C	D	D	B	C	D	C	C	C	C	C	D	D	D
(40) Sussex, E. ...	D	A	D	C	D	A	D	D	D	C	C	D	D	D	C	D
(41) Sussex, W. ...	D	D	D	D	D	D	D	D	C	C	D	D	D	B	C	D
(42) Warwick ...	C	C	C	C	C	C	C	C	C	C	C	C	C	C	D	D
(43) Westmorland ...	D	D	B	D	C	C	C	C	C	D	D	D	D	D	D	D
(44) Wiltshire ...	A	A	B	B	A	A	B	B	C	C	C	C	C	B	B	C
(45) Worcester ...	D	C	D	C	D	C	D	C	D	C	D	C	D	D	D	D
(46) Yorks, E.R. ...	A	D	C	C	A	C	C	C	A	B	R	R	B	C	A	B
(47) Yorks, N.R. ...	B	C	A	A	C	C	A	A	B	R	B	B	B	C	A	B
(48) Yorks, W.R. ...	C	B	A	B	D	B	A	B	B	B	B	B	B	D	C	C

26. Which coefficient should be used in practice will depend to some extent on the purpose in view. By inspection of Table 14 and by examining the primary data in borderline cases I suggest the following classification (see p. 40), of counties as giving a general picture of the geographical distribution of crop-productivity.

<i>Excellent</i>	
Isle of Ely	Lincolnshire (Holland)
<i>Good</i>	
Cheshire	Lincolnshire (Kesteven)
East Suffolk	Lincolnshire (Lindsey)
Essex	Norfolk
Kent	Soke of Peterborough
Lancashire	Staffordshire
<i>Moderate</i>	
Bedfordshire	Northumberland
Cornwall	Shropshire
Durham	West Suffolk
Hertfordshire	Wiltshire
Huntingdonshire	Yorkshire (East Riding)
Middlesex	Yorkshire (North Riding)
<i>Indifferent</i>	
Berkshire	Gloucestershire
Buckinghamshire	Northamptonshire
Cambridgeshire	Nottinghamshire
Cumberland	Oxfordshire
Derbyshire	Somerset
Devonshire	Warwickshire
Dorset	Yorkshire (West Riding)
<i>Poor</i>	
East Sussex	Rutland
Hampshire	Surrey
Herefordshire	Westmorland
Isle of Wight	West Sussex
Leicestershire	Worcestershire

The Isle of Ely and the Holland parts of Lincolnshire are so outstandingly good as to justify their inclusion in a special class.

27. These results are shown pictorially in the adjoined map. On the whole, I think, they will appear to agriculturists as reasonable, but for the reasons given below they have to be accepted with reserve.

One belt of good-moderate area runs down the East Coast to Kent; the other runs on the West Coast from Lancashire to Shropshire. The indifferent belt runs from the South-West through the Midlands, up the Pennine chain and across to the Lake district. The south-east is seen to be poorly productive in respect of crops. One of two counties are a little surprising. Cornwall is unexpectedly high and Berkshire, Leicestershire, Worcestershire and Herefordshire rather low. But I think the coefficients have done their duty properly. In the last four counties the land under crops (as distinct from fruit, vegetables and grazing pasture) does produce low yields. It is interesting to compare this map with geological or rainfall maps.

28. There is one shortcoming in this work arising from the fact that figures for crop yields are available only on a county basis.

This means that no analysis of the area within a county boundary has been possible—a county which is recorded as moderate may in

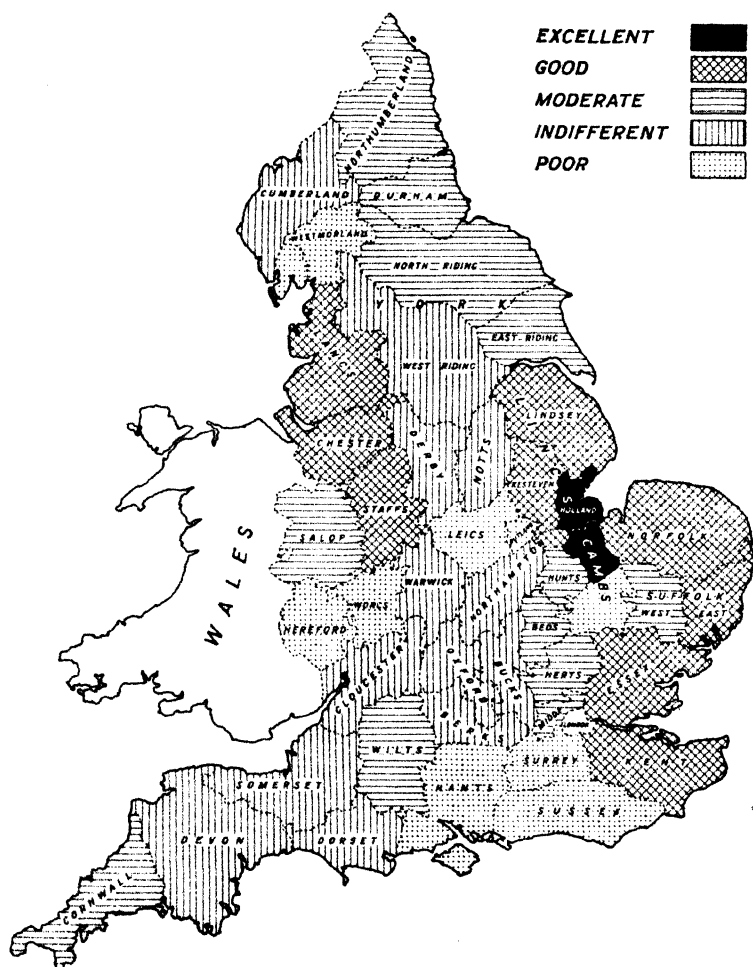


FIG. 1.—Showing the distribution of English Counties classified according to crop-productivity by the methods described in the text.

fact be a mixture of several very good and several very bad districts, or it may contain a large area on which no one of the ten crops is

grown. The results can thus be taken to give only a general picture of the distribution of crop productivity over the country. A district which is homogeneous in type of farming rarely has boundaries even approximating to those of a county. For instance, the productive Fen belt, which accounts largely for the position of Ely and Holland, extends beyond those counties into Norfolk, Huntingdonshire and Kesteven and influences the productivity ranking therein. In a piece of land the size of a county the variations in productivity may be very great, and the description under one of the headings "good," "indifferent" and so on is therefore attended by the usual cautions one applies in using an average to characterize a heterogeneous aggregate. In the map, for instance, the whole of a county has been shaded in even where it is known that a considerable part of its area is under grass or is non-agricultural land.

29. Unfortunately no figures of crop yields for areal units of less than a county are published. I hope that at some future time it will be possible to build up, from parish figures, estimates of yields and production in natural farming-type areas. It is to be expected that the results of such an investigation would modify quite appreciably the boundaries of the areas on the map and would pick out specially productive or non-productive localities which at present can be shown only on the general county level.

30. The value of the coefficients is, of course, dependent on the reliability of the estimates of crop yields themselves. I do not propose to go over this debatable ground again. It was thoroughly traversed by a cohort of pundits led by Dr. Irwin in a recent discussion in the Industrial and Agricultural Research Section; the report of that discussion (1938) and an earlier paper by Mr. H. D. Vigor (1928) give a full account of the various possible points of view on the subject. But I should like to make the point that the coefficients, being designed to compare counties and not to give any absolute measure of productivity, are on that account less likely to be affected by bias in the estimates.

31. In particular, the productivity coefficient has the interesting property of being invariant under one type of what might be called "linear" bias. If the true yields of wheat are in fact a_1, a_2 , those of barley $b_1, b_2 \dots$ and so on; and if the estimated yields are

$$\begin{aligned} A_1 &= l_a a_1 + m_a \\ A_2 &= l_a a_2 + m_a \\ &\vdots \\ B_1 &= l_b b_1 + m_b \\ &\text{etc.} \end{aligned}$$

the l 's and m 's being constant for any crop, but varying from crop to crop; then the productivity axis is the same for the true as for

the estimated yields, since the axis depends only on correlations between the yields, which are unaltered. The projections of the county-points will also be unaltered and thus the productivity coefficients are the same. It would, for instance, make no difference if all the crop reporters in the country went into an ecstasy of optimism about the wheat crop and doubled their estimates. The ranking coefficient has the same property.

32. So far as I know there is no evidence either way to show whether bias of this kind, operating over the whole country on one crop, exists in practice; but some little comfort may be derived from the reflection that two coefficients are independent of it. A more dangerous type of bias would be that in which all crops in one county were wrongly estimated. It is clear that no coefficient can remain superior to inaccuracies of this kind.

33. Precisely similar reasoning shows that in calculating the productivity and the ranking coefficients it is unnecessary to allow for associated by-products or such factors as wastage in cropping, provided that these factors apply universally to the crops affected. Nor would bad weather conditions affect the coefficients if they were prevalent over the whole country and affected crops in a linear way (though, perhaps, differentially). The productivity and ranking coefficients are thus unaffected by a variety of factors which may conceivably distort the other two coefficients to some extent.

Comparison of the Four Coefficients

34. It is evident from Table 14 that the correspondence between the productivity coefficient and the ranking coefficient is good, but I was not prepared to find it so extraordinarily good as a closer examination revealed it to be. An objective measure of correspondence was obtained by ranking the 48 counties in order of merit according to the two coefficients and calculating the Spearman coefficient of rank correlation between the two sets of rankings so obtained. The following values were found for the four years concerned:

1925	...	...	...	.95
1930	...	...	...	.96
1935	...	...	...	.97
1936	...	...	...	.95

In 1925 half the counties had ranks either identical or differing only by one, and only six differed by five or more. The closeness of the two results, which are reached by widely different methods, is surprising. If the effect is typical the ranking method is clearly far preferable to the productivity coefficient method because of the smaller

amount of labour involved in computation. With some parental reluctance I feel bound to admit that the productivity coefficient, attractive as it is theoretically, can probably be replaced in practical work by the ranking coefficient. It would be very interesting to know whether a similar problem has been studied in psychology. So far as I am aware it has not been previously remarked that for reasonably high correlations the average rank will tend to give the same ranking as one type of general factor loading.

35. There is another practical objection to the productivity coefficient which also applies, though much less forcibly, to the ranking coefficient. If at any stage we wish to include additional areas in the inquiry (as for instance, if a county had been omitted by mistake, or it was desired to bring in the Welsh counties) the work has to begin practically *de novo*. All the correlation coefficients have to be calculated and the determinantal equations have to be solved afresh. This would be a serious disadvantage, even if one were fortunate enough to have the services of the Mallock machine, if the work was concerned with farming-type districts or with parishes, whose boundaries are liable to alteration from time to time.

36. The relationship between the money-value coefficient and the energy coefficient, though close, is not so good as that between the other pair of coefficients. By the same method I find the following values of the Spearman coefficient :

1925	...	...	...	.80
1930	...	...	...	.72
1935	...	...	...	.82
1936	...	...	...	.86

Some measure of divergence is hardly surprising in view of the very different points of view from which the two indices are constructed. The crops with the highest price are not necessarily those with the highest energy-content. Perhaps in an enlightened community they would be. But it is common knowledge to the agricultural economist that certain crops, notably animal feeding stuffs, have an affection value unrelated to their nutritive content, and in any case the energy coefficient takes account only of starch. Some difference might also be expected to arise from the fact that the money-value index includes no allowance for the value of by-products, though I should not expect the differences from this cause to be very great.

37. The correspondence between the productivity-ranking methods and the money-value-energy methods is quite good though not so close as that between the individual members of the two pairs. For the Spearman coefficient between the productivity coefficient and the energy coefficient I find :

1925	...	...	...	·69
1930	...	...	...	·48
1935	...	...	...	·62
1936	...	...	...	·61

The difference between the two pairs is probably due to the fact that one is weighted and the other is not. The productivity and the ranking coefficients take no cognizance of the amount of land under a particular crop, but only of the average yield where that crop is grown. A county with a yield of, say, 16 cwts. per acre of wheat on 1,000 acres stands, so far as wheat is concerned, on an equal footing with a county which has only one acre producing 16 cwts. There is an important difference in this respect between the crop yields regarded as scores in a test and the ordinary tests of psychology. I refer to the point again below.

38. Of the four coefficients the ranking coefficient is probably the easiest to calculate in practice and I should expect it to give a reasonable ranking of counties in order of productivity, particularly when it is only required to group them into broad categories. Further evidence would be needed before it could be assumed that the productivity coefficient may always be relied upon to give results in close conformity with those of the ranking coefficient. I have been unable to find any mathematical proof that a close correspondence will always exist, but the values given in paragraph 34 can hardly be due to chance.* It is probable, however, that most agriculturists would prefer the money-value or the energy indices, partly because they have a more clearly comprehensible meaning and partly because they are weighted according to crop acreages.

Relationship of the Productivity Method with the Factor Theory of Intelligence

39. Without wishing to draw a red herring across the main line of the argument I should like to venture a few remarks on the relationship between the productivity and ranking coefficients and the study of intelligence factors.

We can regard the capacity of a county to produce a certain crop as the ability of an individual. The method of appraising the ability is called a *test*, and the linear evaluation of the test perform-

* If the correlations between crops are all unity the two coefficients must give the same results. For the productivity coefficient then becomes a multiple of a single variate (which can be taken to be the yields of any one crop) and the ranking coefficient then becomes a multiple of the ranks for any one crop, i.e. a multiple of the ranks derived from the productivity coefficient. One expects a good correspondence if the correlations are close to unity, the surprising thing being that the correspondence is so good when some of the correlations are far from being equal to unity.

ance a score. The yield of a crop may thus be regarded as the score of a county in a test of ability to grow that crop. The yields expressed about the mean in units equal to the standard deviation give what are known as the normalized standard scores in the ability concerned. The determination of the productivity coefficient is then formally equivalent to the determination of what Hotelling calls a "principal component." * Hotelling considers the normalized test vectors, corresponding to the points in the n -space of paragraph 9, and determines principal reference-axes by the condition that the sums of the squares of the *projections* of the test vectors on to a principal axis is stationary (which is the same thing as a condition that the sums of squares of the distances of the terminals of the vectors from a principal axis should be stationary). These projections he calls "principal components." By their means the test scores can be represented exactly as linear functions of n principal orthogonal components, but the utility of the method is mainly confined to cases in which the greater part of the score variance can be attributed to two or three components. Thurstone (1935) has criticized the method on the grounds that it is psychologically meaningless.

40. There are, however, some important differences between the productivity technique and the factor technique. In the first place, the test of crop growing is unlike the ordinary tests of psychology in one respect. In the latter a subject is usually given a series of tests containing a fixed number of questions and marked in each test according to the proportion he answers correctly. In the growing of crops, regarded as a test of ability, the county is not allotted a specified number of tests consecutively but is, so to speak, allowed to choose how many questions in which test it will answer simultaneously and marked according to the proportion of questions *attempted* which are answered correctly. The analogy would be closer if the brain were divided into sections and each section answered a different test simultaneously; or, alternatively, if the whole of the county were sown first to one crop, then to another, and so on. For this reason I think one must be careful not to press the analogy with psychological work too far. At the same time, some psychologists appear to include in the same battery tests which vary considerably both in regard to the amount of psychic energy required and in regard to the regions of the central nervous system employed in answering them. It is not inconceivable that reactions to different tests may be localized in the brain in the same manner (though to a far less extent) that crop growing is localized in a county;

* Hotelling, 1933. I have adopted the nomenclature and definitions of Thurstone (1935), who gives a formal exposition of various approaches in the factor theory and invariably says exactly what he means.

but the present trend of opinion is, I understand, against this sort of phrenology.

41. Secondly, there are in psychology a practically infinite number of tests which can be applied to the same individual. Perhaps there are also an infinity of crops which can be grown in England, but in fact only a few can be grown commercially, and for purely descriptive purposes it is sufficient to consider only the crops which *are being* grown. This simple remark cuts away from the productivity method a great deal of the controversy which has clung to the factor theory of intelligence since its inception. For example, the arguments between the followers and the opponents of Spearman about the "existence" of a general factor do not affect the use of a productivity factor to describe the performance of the 48 counties *in the growing of the 10 crops considered*.

42. They are, however, relevant if it is desired to extrapolate and infer that an area of high productivity would produce high yields of some crop as yet untried. Broadly speaking, I think it is true that the highly productive areas would do better than the others, although the evidence presented above does not allow a logical deduction to that effect. Sugar-beet, for example, has developed mainly in the areas shown as good or excellent on the map; but to predict the fact would have required some knowledge of the crop. Without some such knowledge it would be a trespass on the data to attempt a forecast of the areas in which soya beans, for example, could find an economic foothold in this country.

43. It is almost impossible to resist a comparison between the productivity factor and a "general" factor for crop yields. So far as the two ideas are comparable it seems to me that the case for the "existence" of a general intelligence factor is weakened by the evidence of this paper. Productivity is admittedly not a simple concept. It is merely the name given to an effect which is produced by a complex of causative influences. I hope the idea will not be found less useful on that account, but the fact remains that it is necessary to guard against hypostasizing the word. If 48 individuals were subjected to examinations in ten very different subjects and the results were found to be strongly correlated, this fact would be hailed by some psychologists as evidence for the existence of a general intelligence factor; and it is not, I hope, an injustice to say that some authorities would regard it as supporting the existence of a primary mental quality called general intelligence. This appears to me to be an error. As several psychologists, notably Professor Godfrey Thomson, have pointed out, the phenomenon can equally well be explained by the overlapping of numerous abilities. This is undoubtedly the case for productivity, which is compounded of climatic,

geographical and pedological influences, to mention only a few, and with some diffidence I am therefore inclined to suggest that the evidence of this paper corroborates the views of Professor Thompson and his followers.

44. In conclusion I should like to refer to a few aspects which have had to be left untouched in this study. The desirability of analysis by farming-type districts instead of counties has already been mentioned. This paper is, in fact, so far as its results go, only a try out of technique preparatory to such an inquiry. It would also be interesting to compute indices over a series of years and to investigate such topics as which areas, if any, are improving or deteriorating, or which are most susceptible to changes in price or climate. And finally, on the theoretical side, it is worth inquiring whether the indices used can be simplified, *e.g.* by the omission of oats and barley, which being highly correlated with wheat, probably contribute very little extra accuracy to the coefficients. All these topics would require much more time and space than can be spared on the present occasion. I mention them in order to make it clear that their importance has not been overlooked.

References

- Greenwood, M., and Yule, G. Udny. "The Statistics of Anti-typhoid and Anti-cholera Inoculations and the Interpretation of such Statistics in General." *Proc. Roy. Soc. Medicine*, 1915, **8**, 113.
- Hotelling, H. "Analysis of a Complex of Statistical Variables into Principal Components." *Jour. Ed. Psych.*, 1933, **24**.
- Irwin, J. O., and others. "Crop Estimation and its Relation to Agricultural Meteorology." *Supp. J. Roy. Statist. Soc.*, 1935, **5**, 1.
- Mallock, R. R. M. "An Electrical Calculating Machine." *Proc. Roy. Soc.*, 1933, **A. 140**, 457. See also *Engineering*, June 22nd, 1934.
- Ministry of Agriculture and Fisheries. *Rations for Livestock*, Bulletin No. 48, 9th Edition, 1936, H.M. Stationery Office.
- Pearson, Karl. "On Lines and Planes of Closest Fit to Systems of Points in Space." *Phil. Mag.*, 6th Series, 1901, **2**, 559.
- Rhodes, E. C. "The Construction of an Index of Business Activity." *J. Roy. Statist. Soc.*, 1937, **100**, 18.
- Thurstone, L. L. *The Vectors of Mind*. 1935. University of Chicago Press.
- Vigor, H. D. "Crop Estimates in England." *J. Roy. Statist. Soc.*, 1928, **91**, 1.

DISCUSSION ON MR. KENDALL'S PAPER

MR. H. D. VIGOR: It gives me great pleasure to propose a hearty vote of thanks to Mr. Kendall for his paper. My pleasure is partly because of the merits of the paper and partly on personal grounds. I first met Mr. Kendall about seven years ago and, learning of his keen interest in pure mathematical research, suggested that practical applications of the mathematical methods of statistics offered wide scope to a man of his equipment. Soon afterwards it was my privilege to propose his election to this Society. Since then Mr. Kendall has been chosen by Mr. Udny Yule to

collaborate in the latest edition of his *Introduction to the Theory of Statistics*. That fact and the present paper are proof enough of his calibre, and as a Society we may congratulate ourselves on having among us a Fellow capable of the best type of research in any statistical field. We may perhaps also congratulate the Ministry of Agriculture on appointing Mr. Kendall to be head of their Statistical Branch. The agricultural statistics of this country offer an immense field for investigation on a scale as yet hardly attempted, and let us hope that the happy union of the right man and the right place will result in a series of comprehensive surveys of statistics shedding light on many important agricultural problems. I trust that someone will not discover next week that Mr. Kendall's proper vocation is in the administration of legislation relating to destructive pests or the Salmon and Fresh-Water Fisheries Act, for I hope he will have a long time at his present post.

In choosing this subject Mr. Kendall has brought us face to face with a fundamental point in our agricultural economy. So great a proportion of the produce of the agricultural industry goes to market in the form of livestock and livestock produce that one is apt to lose sight of the importance of the productivity of the soil itself as a great national asset. More and more of the land has in the past sixty or seventy years been turned over from crop production into pasturage for stock. No one has yet effectively measured the resulting amount of gain or loss in the productivity of the soil. Possibly the data do not admit of accurate measurement. At one time livestock and livestock products were for the most part produced with the assistance of feeding stuffs grown on the land itself. The increased production of to-day is secured to a greater and greater extent with the assistance of imported feeding stuffs. The Agricultural Departments regularly publish computations of the gross value of agricultural output and the changes in its volume, but the question whether there has been an increase or a shrinkage in the value or volume of the net output of the soil remains unanswered.

Mr. Kendall's paper contributes an answer of some importance to the question: In which areas of England is the productivity of the land relatively high or relatively low? Those with some acquaintance with agriculture will not be surprised at the classification of areas given in paragraphs 26 and 27. In his conclusion Mr. Kendall has indicated certain further questions to which the method might be applied advantageously. It would be valuable to know whether the classification of productivity for the different counties would hold good for, say, the period 1885-90.

Mr. Kendall rightly says in paragraph 43 that productivity is compounded of climatic, geographical, and pedological influences, to mention only a few. Is it not possible that a transfer of emphasis in certain counties from crop production to livestock production may have had as a result the development on the part of those engaged in agriculture in those counties of a certain amount of indifference to the finer technique of crop production as compared with the position thirty or forty years ago? I put this forward

simply as a question, but it seems to me that a high degree of skill in the fattening of stock, the management of poultry, and the production of milk is not necessarily correlated with skill in the management and production of crops from the land itself.

To raise one more question: Mr. Kendall has referred to the limitation imposed on his measurements by the absence of any exact data concerning the production of grass from the pastures as distinct from permanent grass that is actually mown. I just wondered whether the amount of hay produced from permanent grass is not to a considerable extent an index of the growth of grass upon the permanent grassland which is not mown to hay. I think that if there is a reasonably strong correlation between the two things—and, after all, a large proportion of permanent grassland is mown to hay, and it is rotated from year to year to a considerable extent—it would be practical for the measurements of crop productivity to be extended to cover production generally and enable comparisons to be made between counties in respect of the whole or nearly the whole of what is produced from the soil.

In conclusion, I feel that this first paper read by Mr. Kendall to the Society gives promise of a first-class series and that this is a very pleasant prospect.

DR. JOHN WISHART: As one of the “cohort of pundits” referred to by Mr. Kendall, it is proper perhaps that I should follow Mr. Vigor and second the vote of thanks. There are two ways in which the paper can be regarded. One is from the viewpoint of the agricultural economist, and I should say that it is probably the agricultural economist, or the agriculturist, or even the geographer, who has been attracted to this meeting, besides the statistician, by the title of the paper, and not the psychologist.

Mr. Kendall has done a useful service in investigating various ways in which he can rank the counties of England in order of their productivity. It might have been interesting to have got hold of an intelligent and experienced farm-economist and asked him to rank the counties in the order in which he would place them without having any figures in front of him, and then we could have worked out the correlation between Mr. Kendall’s rankings and his.

The other way in which the paper can be looked upon is as a statistical study, and there we must appreciate the great pains Mr. Kendall has taken in investigating various coefficients. We should, however, I think, want to pause a little and see what exactly the value of the data may be. In that connection Mr. Kendall has referred to the discussions in the past as to the value or accuracy of the Ministry’s estimates, and he considered that the ground need not be gone over again. He does not indicate whether it is the view of the Ministry that the estimates are absolutely unimpeachable, or whether perhaps they are being gradually improved.

Then there are the methods involved. I should be inclined to look on the final result—namely, the production of a set of co-

efficients or the production of a productivity map—as exceedingly useful as a general exploratory survey, and I rather hope—I say this without taking away from the opinion I have of the value of the work done—that it may only prove to be a beginning, and that further work will be possible, as indeed is indicated by the author himself.

The first two coefficients, being based only on yield per acre, do not take account of the acreage given over to the different crops. There are, of course, sharp county divisions. The survey is perhaps a little too extensive. If anyone were setting out to produce a soil map or an ethnographic map, it is unlikely that he would pay attention to the counties, and the same would emerge with regard to a productivity map. It is fairly true to say that the present boundaries of the productivity map of England and Wales cannot be said yet to be finally demarcated. Certainly there are few among us who would agree to guarantee them in their entirety as at present drawn. If figures were obtainable on a parish instead of a county basis, the situation would no doubt be improved.

One other point I might mention—namely, that the figures used for the final productivity map are the average of four years. There is just a point in this which may have struck others, that while the average is still an average, even if taken over a number of very dissimilar figures, there are two cases to be distinguished: one the case where all areas are more or less alike in their ranking for the different years; and the other, that in which the areas are different. I wonder how far that point was tested.

I share a little of Mr. Kendall's reluctance to abandon the productivity coefficient, which is so closely correlated with the ranking method that the former does not have a strong justification for being adopted generally, particularly in view of the labour involved. But the reason is purely personal, for I have been interested in the development of the Mathematical Laboratory at Cambridge, and I welcome the publicity given in this paper to one of its machines. Looking at the accounts of the Laboratory recently, I observed only two sources of income, one a grant of £1,000 and the other a sum of ten guineas received from the Ministry of Agriculture, presumably for the use of the Mallock calculating machine.

I want to say one word on the psychological connection. Mr. Kendall spoke about the methods leading to his first coefficient being based on psychological work. But are the methods not older than their application to mathematical psychology? At any rate I know now what the author meant when, at a previous discussion in the Industrial and Agricultural Research Section, he spoke of the analogy between psychological testing and agricultural yields. In summarizing his paper to-day he passed over the comparison of different coefficients and the more practical aspects of the subject to concentrate on the analogy with psychology. I am just wondering how far that analogy should be pushed. His discussion should, however, be of value, no less to the psychologist himself than to others who have similar problems.

[The vote of thanks was carried unanimously.]

DR. DUDLEY STAMP said that he was not a statistician, and though he had found the paper of great interest, he was not competent to comment on its statistical aspect. He would confine his remarks to certain conclusions. In paragraphs 29 and 44, the author had partly anticipated his main criticism—namely, that the foundation of data actually available was at the present time totally inadequate to support the superstructure which he had erected on it. Taking for granted that disputed question of the actual value of crop-yield figures, he thought it would be difficult to find any division of England more unsuitable for the arrangement of the superstructure than the administrative counties. It was necessary only to look at the history of English counties to realize why. Many of them in the past were kingdoms based around an area of productive land bordered by unproductive areas through which the present boundaries were actually drawn. Again, in the Midlands, the settlement started on a readily accessible area, and as the sphere of influence from that centre spread, the English county, in the ordinary way, came to include the less accessible or less productive tracts on the margins. Thus, as a general rule, the typical English county did of necessity include tracts of land of very varied fertility. There were certain obvious exceptions to that rule; one thought immediately of the Isle of Ely and the Parts of Holland in Lincolnshire. By way of contrast, for a relatively homogeneous unit of poor character one would choose Westmorland. Holland and the Isle of Ely were in parts of Britain climatically suited to crop-farming, and they had a deep fertile alluvial soil suited to each of the ten crops analysed. They were unique in that, even under the economic conditions of the last decade, they had shown an increase of land under plough. Thus they were ranked by Mr. Kendall as excellent, and in the productivity coefficient and ranking coefficient they stood alone. If, on the other hand, one took a poor county—for example, Westmorland, a region of rugged hilly land, unrelieved by any important arable stretches, and on the wetter side of England—its inferior position was confirmed immediately by Mr. Kendall's tables. In the average county, which embraced wide variations in climate, topography, and soil, one would expect to find wide fluctuations in crop-yields from year to year. He took, as an example of a county including very different areas, the North Riding or Cumberland. The variations from year to year were confirmed in Mr. Kendall's tables.

Taking a county predominant in British farming for other reasons—namely, Leicestershire—where the rich, heavy soils supported the finest pastures in the country, that land in the past, as was known from records available, had been ploughed and had proved very productive of the crops analysed. To-day, apart from the additional cost of ploughing the heavy land, it was regarded by the grassland farmer as too precious to be used for the production of crops. Thus one got that extraordinary result—the most extraordinary result in the whole of these tables—that the county of Leicestershire and the adjoining Rutland were relegated into the “poor” category of counties simply because their valu-

able soils were deliberately kept under grass rather than used for crops.

He felt sure that the whole method of using the county as the basis vitiated the results, and certainly the map produced did not give an answer as to where were the productive areas. He did not think it took them as far as other methods had previously done. He was absolutely incompetent to comment on the value of the method used, but he hoped it would be tested on a small area. If Mr. Kendall would only take an average county and work on a parish basis, he would be able to answer the question of the statistician whether the method he had devised was a suitable one or not. In the Land Utilization Survey an attempt had been made to divide the counties into land-use regions or farming-type units, and although the determination of crop-yields within these units was difficult to ascertain, it was possible to give the carrying capacity of grass lands in terms of cattle and sheep for specific regions which entirely ignored the county boundaries.

MISS RUTH L. CONEX said there was one point in the paper on which she wished to put a question—namely, whether the author's third and fourth methods of grouping really measured variations in the yield between the counties, or whether they did not to a much larger extent measure variations in the proportion of acreage under different crops. Take two counties which had exactly the same yields of wheat and of turnips, and put one of those counties under 90 per cent. wheat and 10 per cent. turnips, and the other under 10 per cent. wheat and 90 per cent. turnips. On the third and fourth classification the first county would come out with a much higher index than the second, for the reason that it had a larger proportion of crop to which a higher money value or a higher energy value attached. It was therefore remarkable that there was so high a degree of correlation between the rankings in the first two lots of coefficients and the second two lots. She supposed it could only be that those counties which had high yields per acre also tended to have a larger acreage under crops of high value. To some extent, therefore, the two lots of coefficients were measuring different things, and since the variation in the proportion of acreage under different crops was generally greater than the variation in yield between different counties in the same crops, the second two coefficients were not really variations in yield between the counties.

DR. C. O. GEORGE said that in a paper of this kind one asked oneself two questions: What was being measured, and what was the nature of the data available? With regard to the first, Mr. Kendall told them that productivity was not to be taken as a synonym for fertility, but as a word to express "the power of agriculture in a particular locality to produce crops without regard to whether that power is due to the bounty of nature or the efforts of man." He had found great difficulty in seeing how such a conception as that could be measured. Mr. Kendall seemed to ignore that conception until towards the end of his paper, where he harked

back to the idea that he was measuring some inherent power of agriculture to produce. This might not be of much importance, perhaps, until one realized that this vagueness of definition led to further difficulties later on in the money-value coefficient. There he must admit that he found it beyond his power of comprehension to conceive what was being measured. He realized that money factors must play a very important part in agriculture, but to take just one vague factor, such as these averages over years, seemed likely to conceal more than it would reveal.

Further difficulties arose if these figures were, as suggested, regarded as index numbers. Suppose, in years to come, someone wished to bring the index up to date. Would he not be faced with two awkward alternatives: either to calculate a new set of average prices, which would presumably mean re-calculating all Mr. Kendall's figures, or, if he retained the latter's averages, might they not by that time have little more value than, say, weights chosen at random?

Similar difficulties appeared to arise in varying degrees in connection with the energy coefficient, but time forbade detailed comment.

With regard to the productivity coefficient, he was sure that everyone must understand Mr. Kendall's parental grief, but few would weep over his Stoic resolve to stifle at birth the infant which might yet prove a valuable theoretical specimen. There was a good deal to be said in favour of his much simpler ranking coefficient. Unnecessary complication could be of no value except to a witch-doctor or a Heath Robinson, and the ranking coefficient had long been recognized as a useful method in connection with examiners' marks. There was some analogy between such marks and Mr. Kendall's, although here there was not one "examiner," but many hundreds, and a very substantial number of students might refuse to be examined at all.

Finally, if a zealous psychologist were given these data, one wondered if he might not be tempted to draw almost as many inferences with regard to the persons who did the estimating as they had drawn with regard to the crops. He concluded by repeating his high appreciation of Mr. Kendall's work and of the exceptional quality of this paper, in particular.

DR. J. O. IRWIN said that although he was not a leader of "a cohort of pundits" of any description, he wished to congratulate Mr. Kendall very heartily on a paper of exceptional interest. He would confine his comments to Mr. Kendall's remarks in paragraphs 9 and 43. The mathematical derivation in paragraph 9 of the Index of Productivity struck him as particularly clear. It brought out lucidly a point which had sometimes been allowed to stay in obscurity. If one fitted a straight line to a set of points in space by minimizing the sum of the squares of the perpendicular distances from it, the straight line obtained depended essentially on the scale in which one measured the variables. Supposing one were to double the unit of measurement of some of the variables but not others, and then repeat the process, one would get a line which would not be a transform of the original line. From Mr. Kendall's point of view

that was quite immaterial. He wanted a good-fitting straight line, and his method of using scores in standard measure gave it to him; but from the point of view of factor analysis the objection was rather more weighty. Mr. Kendall had pointed out that his procedure was essentially the same as that of Hotelling, who had also realized the difficulty. Hotelling had said that the method of "principal components" could only be applied if for each test score there existed a unit of measure of unique importance, and further, if linear transformations which do not depend on rotation of axes were unimportant. In other words, a *metric*—a definition of distance—must be assumed, and not simply a set of axes. Hotelling had also pointed out that the particular metric employed by the method of principal components was based on the assumption that the unweighted sum of the variances, where the total variance of each test was taken at unity, was the essential quantity to be analysed. From the point of view of the ultimate validity of factor analysis of the possibility of discovering something psychologically or physiologically fundamental, it did seem rather a drawback that the factors obtained should depend on the scale of measurement one chose to employ. From the point of view of having a useful statistical weapon for simple descriptive purposes, this did not matter. Dr. Irwin thought that the chief value of factor analysis as at present used was in the latter direction. If, for example, Spearman's tetrads were found to vanish, there were a great many possibilities of factorization besides the particular choice of a general factor and as many specifics as there were tests. For these reasons, though again with a good deal of diffidence, he agreed with Mr. Kendall's conclusion in paragraph 43, and in fact it seemed to him that the general position of factor analysis in statistics was the same as that of many simpler statistical weapons, for example, the correlation coefficient.

A particular assignment of factors which fitted the observed data could be explained in many different ways, just as a correlation coefficient could. We could arrange for a correlation coefficient of 0.5 between dice throws suitably combined. But this did not disprove that the correlation coefficient of roughly the same magnitude between, say, the stature of father and son was due to physical heredity. One believed in the latter explanation because there were many lines of argument in support of it apart from the data from which the correlation coefficients were calculated. One could conceive of fathers influencing their sons' stature, but not the reverse. Geneticists might even give some account of the mechanism. Another most important reason was the absence of any other hypothesis that fitted the facts. When one had an hypothesis as plausible as that of physical inheritance, the correlation coefficients very much enhanced our belief in its truth. If the hypothesis of a single general factor of intelligence were itself as plausible as that of physical inheritance, the vanishing of tetrads or a similar result obtained by Hotelling's process would lend it very great weight. But if there were other and perhaps more convincing hypotheses consistent with the facts, one must remain in doubt.

DR. F. YATES joined the other speakers in expressing thanks to Mr. Kendall for his interesting paper. In these days of economic planning, studies of the basic facts of agricultural production were of the utmost value, for they provided the knowledge on which all sound economic planning should be based, and their value would be still further increased in the case of a national emergency, for when the emergency came there would be no time to make studies such as the present one. The information must be accumulated and sifted beforehand.

Some of the previous speakers had criticized the material on which Mr. Kendall had based his studies. This did not seem to him (Dr. Yates) a sufficient reason for not undertaking those studies. If there were defects in the material, then they would be brought to light in the course of just such studies as these, and as a result those responsible for their collection would be in a position to take the necessary steps to improve them.

Mr. Kendall had calculated four coefficients of productivity, and they all told much the same tale. This was, of course, not surprising, as they were all weighted means of the same set of values, and it was well known that quite large variations in the weights would not usually affect the means greatly. He must confess, however, that he had strong preference for Mr. Kendall's last two coefficients over the first two, for reasons which he would attempt very briefly to explain.

The first coefficient was attractive, in that it conjured up, from the observations themselves, an entity "productivity." If productivity were really an entity, and if the yield values for the different crops were affected only by this entity and by random uncorrelated variations, the approach might be satisfactory. But in fact such conditions did not hold. Productivity for wheat might be at its maximum when productivity for some other crop—permanent grass, for instance—was low. If there were a number of highly correlated cereal crops which dominated the data, and if the yield of grass was negatively correlated with cereals, then grass would actually receive a *negative* weight in the productivity function. Counties with particularly good permanent grass crops would then give a lower "productivity" than those equal in other respects but with poorer grass crops.

This would scarcely seem to be what was required, and though in the present case conditions were not so extreme as this, the correlation of permanent grass with the other crops, and particularly with cereals, was low, and it would consequently have received little weight.

He thought, therefore, that they must first decide what they meant by "productivity," and base their weights on that decision, as Mr. Kendall had done in calculating his third and fourth coefficients.

Mr. Kendall's results appeared to contain some confirmation that his third and fourth coefficients were in reality giving better measures of productivity than his first two. Other things being equal, one might reasonably prefer a coefficient which arranged the counties in the same order in the different years, to one which

arranged them in substantially different orders. Inspection of Table XIV immediately showed that the first two coefficients were much more variable from year to year within the same county than were the last two coefficients. An analysis of the variance of Table V (productivity coefficient) and Table IX (price coefficient) confirmed this. These analyses gave the following results.

TABLE V

TABLE IX

	D.F.	S.S.	M.S.	S.S.	M.S.
Counties	47	441.77	9.40	499902	10636
Years	3	58.43	19.48	3895	1298
Remainder	141	362.51	2.57	15174	108
Total	191	862.71		518971	

For the productivity coefficient the mean square between counties was only 3.7 times that of the remainder, but for price coefficient it was nearly 100 times that of the remainder. It was of course, true that variations in weather would produce some change in relative merit, but such changes would appear to be given full weight in the third and fourth coefficients.

The additional variation in the first two coefficients would therefore appear to be an indication that they were not, in fact, measuring productivity (in so far as this was taken to represent some essentially permanent feature of the agriculture of the county) as well as were the third and fourth coefficients. If, in spite of these objections, it was considered that some coefficient analogous to Mr. Kendall's first coefficient was required, then he thought the calculation of a single function from the whole of the four (or more) years' data would provide a more stable coefficient, and one which was easier to calculate. The methods recently developed by Fisher in connection with the discriminant function would then provide exact tests of significance for the co-linearity of the counties.

There was also one refinement which might be introduced in certain cases instead of using weights based directly on price, energy value, etc. It might happen that certain of the components that went to make up the weighted mean it was desired to form were much less accurately determined than others. If so, the statistician would naturally be reluctant to give them such high weights as they would otherwise receive. The correct weighting coefficients might then be arrived at by so choosing them that the variance of the differences between the true measures and the weighted means was minimized. This could only be done if the error variances and covariances of the various measures were known, and was therefore not applicable in the present case.

It would take too long to set out the mathematics involved, so he would take the course of communicating it to the editors in a separate note.* The whole process was analogous to the deriva-

* [To be printed in Part II. *Ed.*]

tion of what was known as a discriminant function, and would require the solution of ten simultaneous linear equations, as did the resolution into principal components, the basis of Mr. Kendall's first coefficient. It must, however, be clearly distinguished from the method of principal components: the latter merely picked out the measure which best agreed with the totality of the observations, the former had as its basis an objective conception based on the nature of the material which was being handled.

DR. E. C. WILLATTS said that he spoke from the point of view of agricultural geography. He was not a statistician, and was quite incapable of criticizing, or even of appreciating fully, the merits of statistical performance. But as an economist he had been deeply interested in the results and in the objectives of the paper, and he was delighted to find that an approach was being made by statistical methods to an analysis of productivity in this country, because this was certainly needed very seriously. He felt, however, that they ought to break away from a county approach and, as Mr. Kendall himself had suggested, attempt a regional approach. Mr. Kendall had mentioned farming-type units, and he thought that these would give a very different ranking than that in which Mr. Kendall had placed the counties. Many of them would place the counties in a very different order, always excepting the two at the top—namely, the Parts of Holland and the Isle of Ely. Partly because of the productivity of the grass, some of the others would take a different place from that which they occupied in Mr. Kendall's tables, especially because the very best grass was cut to hay very little if at all, and was used for grazing. In the reports of the Land Utilization Survey a somewhat tentative approach to this was made in the case of Rutland, where a set of figures prepared a hundred years ago giving details of each parish were examined, as also the statistics of the Ministry of Agriculture at the present time. The proportion of grass for each parish was shown graphically and compared at the same time with the stock carried in that parish on the grass, the stock being divided into dairy cattle and other stock—that is to say, trying to distinguish the animals which were fattened on the grass. This showed a very definite regional deviation within the county—a poor eastern part, and a rich western part on the grass not cut to hay—and it showed the persistence of these trends over more than a century, as well as an improvement in carrying capacity on the better pastures over that period. The important factor of imported feeding-stuffs was, of course, ignored, but the result did show that there was a great scope for development of that kind of thing on a parish basis.

The criticism of the paper which he would put forward was the point that fertility and productivity could often be gauged, in the present state of British agriculture, from just those groups which had been omitted from consideration in the present discussion. The market-gardening crops of this country were confined almost entirely to the richest soils, those most easily worked, and those which, if under a crop such as wheat, produced the very highest

results. Those tracts were usually restricted to certain portions of counties, and formed little pockets of land well worth taking into consideration when assessing fertility. For that reason he was surprised that Middlesex did not rank very much higher in this analysis. This was probably because it grew very little wheat, oats and barley, but was much under fresh vegetables and fruits, and similar crops. Leicestershire was in the poor category; he would have thought it a great deal higher. He was surprised that Worcestershire and Herefordshire, parts of which were extremely rich, were so low in the ranking. Such points stressed the case for leaving the county boundaries and adopting smaller areas, and he hoped that Mr. Kendall would benefit the cause of agricultural geography by carrying the work into more detail in that direction.

MR. BABINGTON-SMITH said that he was grateful to Mr. Kendall for stressing the psychological analogy. By so doing he had drawn attention to certain weaknesses in the psychological approach. He himself was much interested in the nature of the "entities" that resulted from factor analysis; he had always felt unsatisfied by the concept of the general factor, and had tried to find out if it could be put otherwise. It seemed to him that that could be done. He wished to suggest an alternative method of expressing the analysis. In order to make his point clear, instead of thinking, as Mr. Kendall had done, of 48 points in 10 dimensional space, he asked his audience to think of 10 points in 48 dimensional space. Having done so, they might simply think of the constellation of 10 points in relation to the origin, and in that case the correlations among the 10 points could be expressed as the cosines of the angles subtended at the origin by pairs of points. Holding that constellation, let them now dismiss the 48 dimensions which gave rise to it, and they would realize that the constellation of 10 points could clearly be produced in any space of 10 or more dimensions. The purpose of factor analysis was to construct a hypothetical space to contain this constellation. Roughly speaking, it was to construct a space of as few dimensions as possible wherein the constellation could be contained. The important point arose as to the nature of the new space. Could a meaning be attached to the dimensions or co-ordinate axes? It seemed to him quite possible to fit this constellation into space of any number of dimensions, and thus represent any population by a hypothetical population of a nature directly comparable to the original. In fact, the purpose of factor analysis was to construct a hypothetical population whose members were of exactly the same nature as the original population—that is to say, the psychologist, having plotted ten tests in space, constructed a hypothetical population of 11 people, not factors, and the analysis was in terms of people, and not in terms of factors. He would suggest that where they spoke of a general factor, what they meant was that the original population could be expressed in terms of another population, a smaller one, where there was one type who scored high on all tests, and others whose scores were less. His point was that they were trying to devise a hypothetical population

which should retain the characteristics of the original population—namely, the inter-correlations. He found it rather difficult to transform this to Mr. Kendall's approach, and time forbade him to go further into the matter at the moment.

THE PRESIDENT said that the Society was to be congratulated on having had this paper which was both mathematical and practical, and he himself had been very much interested in some parts of the discussion. He judged that the main result of the discussion was that the methods of approach were considered good and stimulating, but the material on which they were based was imperfect and rough. It was Mr. Kendall who was responsible for the methods, and it was history and the Board of Agriculture who were responsible for the data. It was possible that the counties might come out a little better than the geographers expected. On studying Table I, it was apparent that, whatever these counties were, they still showed factors which could be measured on a rational basis. Mr. Kendall did not make very much of his Table I, and perhaps speakers had forgotten about it, but there it was, and it suggested that something had been measured—agriculturists and geographers could perhaps tell them what.

After the Meeting MR. R. F. GEORGE wrote as follows :

It is an elementary maxim that the least fertile land is the first to go out of cultivation, and in this connection Mr. Kendall's paper provides an interesting opportunity of comparing the relationship between crop-productivity and changes in the cultivated acreage. Counties with poor crop productivity should be those with the greatest decline in the arable acreage, and, conversely, those with excellent crop productivity should be those where least land has gone out of cultivation. I have worked out for each of the English counties the decline in arable acreage over the last 10 years, expressed as a percentage of the arable area in 1929, and have arranged the counties in descending order of percentage loss. Mr. Kendall includes 10 counties in his group of "poor" crop productivity, of which 6 occur in the 10 counties with the greatest percentage loss of arable land. He gives 14 counties in the "indifferent" group and in the next 14 (*i.e.* numbers 11-24); in my list there are 7 of Mr. Kendall's "indifferent" counties. If we take Mr. Kendall's "poor" and "indifferent" counties together, of which there are 24, no less than 17 of these appear in the 24 counties which have suffered the greatest relative decline in arable acreage. It is of particular interest that the two areas he distinguishes as being of excellent crop productivity are the only two areas out of the 48 which show an actual increase in arable acreage. Admittedly, the increase is slight (3.0 per cent. for the Isle of Ely and 1.6 per cent. for Lincolnshire (Holland), but, even so, they remain the only areas for which any increase is recorded.

The connection between Mr. Kendall's ranking and the decline in arable acreage is necessarily subject to a number of qualifications, and at best only a broad comparison can be made. Nevertheless,

I feel that the decline in the arable area, county by county, does serve to confirm Mr. Kendall's conclusions.

MR. KENDALL in reply said he would avail himself of the opportunity of making a full reply in the *Journal*. He would, however, like to refer to the points made by Dr. Stamp and Dr. Willatts. It was an inherent defect in this work, as far as it was a practical description of the geography of the country, that it did deal with particular counties and not with farming districts. Such value as might be claimed for the paper lay in the nature of the trial methods rather than in the results themselves, but he did differ from Dr. Stamp on one point. Dr. Stamp, if Mr. Kendall understood him correctly, suggested a division of the country on climatic or pedological lines. Mr. Kendall thought that if one had to select smaller areas within the county for study, one would select them on a farming type basis, not on a geographical basis. Apart from soil and climate the existing organization of the farm had a powerful influence on its nature and on its productivity. That was an important point for a further study of this kind.

He was much obliged to the meeting for the vote of thanks, and to Mr. Vigor and Dr. Wishart for the kind and encouraging things they had said in their opening remarks. Mr. Vigor was responsible for his first introduction to statistics as a science, but was, he feared, incorrect in placing Mr. Kendall at the head of the Ministry's Statistical Branch, which Mr. Vigor himself adorned with distinction at one time. He (Mr. Kendall) was associated with the recently formed Economics Intelligence Division, and in that capacity he hoped to do something to justify Mr. Vigor's good wishes.

MR. KENDALL afterwards wrote as follows :—

In his very kind opening remarks Mr. Vigor raised some points of interest and importance. I agree with him that it would be interesting to go back fifty years and compare the productivity of England at that time with its productivity to-day. When time permits I hope to investigate whether the methods of this paper can be used to trace historical effects over a long period. I am also much attracted by his useful suggestion that it may be possible to take grazed grass into account through the medium of its correlation with mown grass. There are some obvious difficulties here—for instance, the recorded hay yields depend very much on the harvest weather, which would not influence grazing conditions over the whole year to so great an extent—but it is from many points of view desirable to know what the relationship between the two is.

Dr. Wishart, I think, sought to draw me on the question whether the Ministry of Agriculture thinks that its crop estimates are unimpeachable. Dr. Stamp goes further, and says that the data are totally inadequate to support the superstructure which I have erected on them. I am not briefed to defend the Ministry's estimates, and I do not think anyone at the Ministry would deny that considerable improvements are possible. At the same time, it

seems that the statistics of a Government Department are criticized much more severely than data obtained by private authorities, and for that reason are put in a very unfavourable light. These estimates are not perfect, any more than other statistical data; but I consider that they can be made the basis of a rational judgment. The fact that county yields *are* correlated, and the interesting contribution made by Mr. R. F. George serve to show that there is useful information to be extracted from the material.

On reading their contributions I think Dr. Stamp, Dr. Willatts and I are really in agreement about the necessity of conducting regional enquiries on a farming type basis. I used county figures only because there was nothing better to be had. An enquiry on the farm-type or farm-district basis would really meet Dr. Willatts' point about the inclusion of market garden areas.

The point raised by Dr. Yates at the end of his remarks appears to me of fundamental importance in the construction of index numbers, and I look forward to reading his note on the subject. Just how far the discriminantal method of arriving at weighting coefficients is applicable to agricultural index numbers remains to be seen, but it will be an interesting line of enquiry.

I am glad to know that Dr. Irwin and Mr. Babington Smith found something of interest in the psychological references in the paper. I hope Mr. Babington Smith will develop his ideas further. As I understand them, the search for general factors would be replaced by the search for typical areas in terms of which all the areas could be expressed. There may be here some useful investigations to be done on representative sampling.

In conclusion, I would like to thank all the contributors to the discussion, not only for the reception they accorded to the paper but for the many useful suggestions for further inquiry which they made.

As a result of the ballot taken during the meeting the candidates named below were elected Fellows of the Society :—

William John Beer.
Bernard Benjamin, B.Sc.
Barrie Nicholas Davies, B.A.
David Kelvin-Stark.
Werner Gustav John Knop.
Victor Selwyn.

Jacques Boulos Simaika, B.Sc.
Dhurjaty Subrahmaniam.
Reginald Taggart.
Frederick Jesse Trash.
Helen Newton Turner.
Frederick Charles Westley.

MISCELLANEA

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**THE TREND OF NET PROFITS OF COMMERCIAL AND INDUSTRIAL
ENTERPRISES, 1928-37**

By A. STANLEY CARRUTHERS, A.C.A.

IN this article an endeavour has been made to trace the trend of the net profits of commercial and industrial enterprises for the calendar years 1928-37 inclusive. For this purpose certain guiding principles have been laid down and adhered to. The figures used relate solely to public companies, the shares of which are quoted on British Stock Exchanges. In order to confine the results obtained strictly to Commerce and Industry, profits of the following classes of companies have been excluded :

- (a) Public Utility Companies : Light, Heat, Power, Water, etc.
- (b) Companies engaged in Transport and Communications : Railways, Road Transport, Aviation, Shipping, Canals, Docks, etc.
- (c) Mining (other than Coal and Iron) and Oil Companies.
- (d) Plantation Companies : Tea, Rubber, Coffee, Sugar, etc., Estates.
- (e) Investment and Financial Trust Companies, Property Companies, etc.
- (f) Banks and Insurance Companies, etc.

In addition, all purely holding companies have been excluded in order to avoid duplication of returns, and also because of the fact that profits disclosed are not necessarily the true profits of a group of companies, but only, as in many cases, the total of dividends out of profits earned by the subsidiary companies. Further limitations imposed have been :

- (a) Companies included in the analysis are British Companies carrying on business in Great Britain and Northern Ireland.
- (b) The Company's year has ended on December 31st in each and every year during the ten years surveyed.

The acceptance of these limitations has had the effect of reducing the number of the company reports selected very considerably. The results are based on a comparatively small sample, but are, it is thought, probably adequate to give an indication of the trend in various industries.

The compilation has been based on Reports received by the Statistics Department of my Company, The Exchange Telegraph Company, Ltd., during the first five months of 1938. In all, in this period, some 2,099 Reports were received for years ended in 1937 or 1938, but after deducting the classes excluded, as mentioned above, and new companies, the number was reduced to 1,036; and when allowance was made for companies for which the year ended on some date other than December 31st, and those without a complete ten-year run on the calendar-year basis, the number was finally brought down to 260.* No selection other than mentioned above has been made. All companies' Reports coming within the above specification have been included without discrimination. Originally it was intended to carry the survey back to a date earlier than 1928, but the difficulties experienced in getting a sufficient sample made the decision to limit it to ten years necessary. If the period surveyed had been for eight years—viz., 1930-37—a further fifty-one companies could have been included, some of very considerable importance. It is felt, however, that a ten-year period is a happy compromise, and covers probably the extreme peaks of the recent trade cycle.

The figure taken as "profit" has been "Net Profit after Depreciation and Taxation, and after Debenture Interest"; in other words, the net profit available for distribution amongst shareholders (both Preference and Ordinary). Whether profit should be calculated before or after Debenture Interest is debatable, but it is not intended to enter into any discussion here. If "before Debenture Interest" had been taken, it would have meant reducing further the number of companies in the sample, as in a number of cases the amount is not ascertainable. Again, if based on "before Debenture Interest," the question of loan interest would have arisen, and the amount thereof is not always disclosed. As regards taxation, transfers to Income Tax Reserve in any year have been charged against profits for that year, but transfers from such a reserve so as to swell the profit of any particular year have been excluded. So far as possible, an endeavour has been made to keep the profits on a comparable basis throughout.

* Between the end of May and end of October a further eight Reports were received on the above basis. With one exception they were, however, of small concerns, and unlikely to affect the results in any way.

It is unfortunate that in an analysis of this kind purely holding companies must be omitted, for it also means the exclusion from the analysis of many subsidiary companies of considerable size and importance, which remain entirely unrepresented where the holding company owns all the capital.

A table showing the general result of the investigation is set out below (Table I). The sample has been divided into four main groups, which in turn have been further subdivided, so that in all there are some fifteen divisions represented. The year 1930 has been selected as a convenient base for calculation of the index, and thus falls into line with the Board of Trade Indices of Production and of Wholesale Prices.

It will be noted that in the base year 1930, out of Net Profits amounting for the 260 companies to £15.3 millions, the following industry groups accounted for nearly 73 per cent. of this total: Breweries, Distilleries and Mineral-water Manufacturers, £3.1 millions; Food and Tobacco, £1.9 millions; Heavy Engineering and Shipbuilding, £1.8 millions; Paper, Printing, Publishing and Newspapers, £1.6 millions; Light Engineering, including Electrical Equipment, Cables, Motors, etc., £1.5 millions; and Building, Contracting, Sanitary Engineers, Decorating, etc., £1.4 millions. The Net Profits of Breweries, Distilleries, and Mineral-water Manufacturers alone accounted for not far short of 20 per cent.

In 1937 the order and degree of importance had changed considerably. Breweries, Distilleries, and Mineral-water Manufacturers still came first with £3.5 millions out of a total of £23.5 millions, followed by Light Engineering, including Electrical Equipment, Cables, Motors, etc., £3.4 millions; Heavy Engineering and Shipbuilding, £3.4 millions; Iron and Steel, £2.6 millions; Paper, Printing, Publishing and Newspapers, £1.9 millions; Building, Contracting, Sanitary Engineers, Decorating, etc., £1.8 millions; Food and Tobacco, £1.5 millions; and Coal, £1.3 millions—which accounted for 83 per cent. of the whole.

It should be pointed out that no attempt has been made to apply any system of weighting, but the above information has been given to show the respective importance of the various groups from the point of view of "Net Profits."

The distribution of Net Profits by major groups is further illustrated by the two following Charts (I and II). The first shows the total value of the Net Profits of the 260 British Companies and its division into major groups for each of the ten years 1928-37 inclusive; whilst the second indicates the proportional change in each of these groups during the ten-year period.

Indices of Commercial and Industrial Net Profits for Calendar Years 1928-1937 Inclusive

Base 1930 = 100

Class	No. of Companies	Prof. and Share Capital at end of 1937 (\$000)	Net Profits in 1937 (\$000)	Net Profits after Taxation, Depreciation, and Debiture Interest									
				1928	1929	1930	1931	1932	1933	1934	1935	1936	1937
FOOD, DRINK AND TOBACCO : Breweries, Distilleries and Mineral-water Manufacturers	32	25,826	3,055	98.6	105.6	100.0	88.2	69.1	87.0	108.5	113.2	114.6	115.2
Food, Tobacco, etc.	18	15,075	1,930	103.6	108.9	100.0	70.3	45.0	62.4	59.6	69.8	74.6	79.5
Total Food, Drink and Tobacco	50	40,901	4,985	100.5	106.9	100.0	81.2	59.8	77.5	89.5	96.4	98.2	101.4
TEXTILES : Cotton Preparing and Manufacturing †	4	3,329	150	235	231.1	100.0	138.9	117.1	131.6	161.8	168.0	184.6	156.5
Woolen Manufacturing and Clothing	9	6,346	250	467	232.8	100.0	163.8	123.5	138.4	142.9	149.0	233.4	186.6
Other Textiles, including Dyeing and Bleaching	8	4,197	256	161	147.4	100.0	82.3	55.0	36.2	48.6	49.1	61.6	62.9
Total Textiles	21	13,872	656	863	212.3	100.0	130.9	95.3	97.1	110.5	119.3	155.3	131.5
COAL, IRON AND STEEL, AND ENGINEERING : Coal	10	10,072	484	1,288	122.5	100.0	113.3	116.6	132.5	146.3	164.0	214.8	266.3
Iron and Steel	9	18,786	531	2,642	167.1	100.0	37.9	35.4	134.3	197.9	220.5	287.9	494.4
Heavy Engineering and Shipbuilding	26	28,856	1,768	3,361	190.9	114.7	100.0	70.4	54.5	89.0	133.1	158.7	190.2
Light Engineering, including Electrical Equipment, Cables, Motors, etc.	23	15,353	1,469	3,136	100.9	100.0	94.8	98.4	103.5	143.2	171.6	226.8	235.3
Total Coal, Iron and Steel, and Engineering	68	73,067	4,246	10,727	97.5	122.2	100.0	80.7	90.3	127.9	161.9	204.8	252.6
OTHER INDUSTRIES : Building, Contracting, Sanitary Engineers, Decorating, etc.	25	12,635	1,384	1,819	95.8	100.3	100.0	89.2	72.9	91.5	113.8	131.9	133.6
Chemicals, Drugs, Soap, Perfumes, Paint, Oils, etc.	12	5,453	367	686	167.5	149.6	100.0	89.5	104.8	149.0	171.5	177.3	186.7
Leather, Boots and Shoes	13	7,583	631	632	87.0	71.2	100.0	84.7	76.8	82.5	96.9	107.0	100.1
Paper, Printing, Publishing and Newspapers	15	18,929	1,566	1,936	128.8	120.5	100.0	86.0	96.8	106.3	118.1	124.0	123.7
Warehousemen, Drapers, etc.	10	2,724	156	113	137.0	143.0	100.0	81.1	15.3	51.4	76.5	80.8	91.6
All other Classes	46	19,568	1,321	1,655	149.1	150.9	100.0	62.6	48.4	78.8	102.8	115.9	125.3
Total Other Industries	121	66,892	5,425	6,901	123.3	119.6	100.0	81.0	74.5	89.8	102.1	114.9	127.2
TOTAL ALL CLASSES	260	194,732	15,312	23,546	112.6	119.6	100.0	83.1	72.4	86.2	105.5	122.1	139.9

* These indices show a greater fall than was possibly the case, owing to inclusion of one important company which suffered severe losses in these years.

† Indices for this class are very reliable, as largely dominated by a large company; other three companies comparatively small.

‡ Indices for these years probably affected to a small extent by fairly considerable losses of one important company.

§ The indices for this group are to a certain extent influenced by results of one important company, but without this company they show little variation from those given except for years 1934, 1935 and 1936 where, excluding it, indices would be about 6-8 per cent. less.

A study of Table I reveals several interesting points, especially if the indices are re-grouped under the headings of Home Industries and Exporting Industries. In the former group have been classed Food, Drink and Tobacco (as a whole); Building, Contracting, Sanitary Engineers, Decorating, etc.; Leather, Boots and Shoes; and Paper, Printing, Publishing and Newspapers. In the second division have been placed Textiles (as a whole); Coal; Iron and Steel; Heavy

CHART I

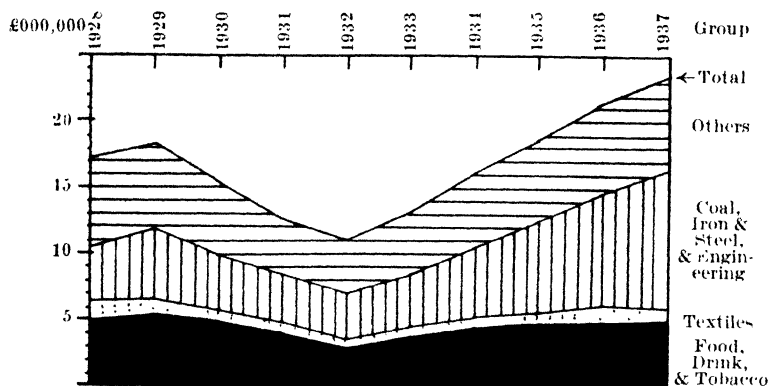
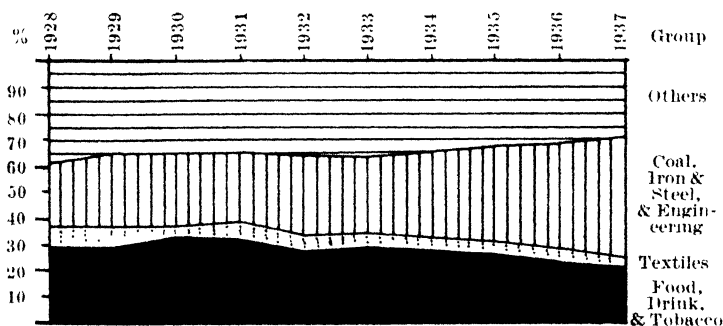


CHART II



Engineering and Shipbuilding; Light Engineering, including Electrical Equipment, Cables, Motors, etc.; and Chemicals, Drugs, Soaps, Perfumes, Paint, Oils, etc. There is, of course, a large "home industry" in this latter group, but the United Kingdom's Exports of Domestic Produce are predominantly from these classes.

The first point that is immediately noticeable is that the fluctuation in Net Profit is far greater in the Exporting Industries than in the Home Industries, as is illustrated by the following figures

showing "the spread" between the highest and lowest indices in each group for the ten-year period.

Number of Companies	Home Industries	Spread, 1928-37	Highest	Lowest
103	50 Food, Drink and Tobacco	47.1	106.9	59.8
	25 Building, Contracting, Sanitary Engineers, Decorating, etc.	60.7	133.6	72.9
	13 Leather, Boots and Shoes	35.8	107.0	71.2
	15 Paper, Printing, Publishing and Newspapers	42.8	128.8	86.0
Exporting Industries				
101	21 Textiles	117.0	212.3	95.3
	10 Coal	266.3*	266.3	Loss
	9 Iron and Steel	459.0	494.4	35.4
	26 Heavy Engineering and Shipbuilding	135.7	190.2	54.5
	23 Light Engineering, including Electrical Equipment, Cables, Motors, etc.	140.5	235.3	94.8
	12 Chemicals, Drugs, Soaps, Perfumes, Paint, Oils, etc.	97.2	186.7	89.5

* Actually somewhat greater than this figure.

It is not possible to determine the respective parts played by "recovery" (pure and simple) and "rearmament" in the industrial revival that took place in this country between 1932 and 1937. That there was a substantial recovery from the depths of the depression is shown by this Net Profits Index, as well as by the many well-known indices. The value of the United Kingdom's Export Trade (Domestic Produce) increased by some 43 per cent. in that period. In certain industries the increase was much greater than the average—*e.g.*, exports of Iron and Steel and Manufactures thereof increased by 73 per cent. in value; Machinery by about 70 per cent.; Electrical Goods and Apparatus by about 117 per cent.; Motors and Parts by over 120 per cent.; and Chemicals, etc., also showed a substantial increase; but, on the other hand, Cotton Manufactures increased by only about 9 per cent., and Coal by rather under 20 per cent. Substantial as have been the increases shown in the export trade in the "heavy" industries, the contribution of "rearmament" to the increases shown in the profits made in the Coal, Iron and Steel, and Engineering groups must be very considerable in the more recent years; particularly must this have been the case in "Iron and Steel."

The larger fluctuations in the Net Profits of the Exporting Industries possibly reflect, too, the hazards attending foreign commercial transactions, such as quotas, tariffs, exchange restrictions,

etc. It will be noted that in this group the only index number to show a decline in 1937, as compared with 1936, is Textiles. The explanation of this is probably to be found in the considerable falls in the price of Raw Wool and Raw Cotton in the latter part of 1937.

Another point that possibly requires explanation is the differing experiences of Light and Heavy Engineering between 1930 and 1937. The indices for Light Engineering reflect the increasingly favourable results, particularly from 1934 onwards, of the large cable-makers, suppliers of lighter electrical equipment, and motor engineers. Heavy Engineering made an equally rapid "come-back," but profits had fallen much lower than those for Light Engineering. The fall in the Heavy Engineering indices to 54·5 in 1933 was undoubtedly largely owing to the poor business experienced by companies engaged in Shipbuilding, Manufacture of Machinery and Heavy Electrical Engineering. In 1933 the tonnage of merchant vessels launched was only one-eleventh of that for 1928, and one-seventh of that for 1937. As regards Electrical Engineering, the index of activity of the British Electrical and Allied Manufacturers' Association, based on 1924 = 100, and which stood at 89·8 in 1928, had fallen to 59·6 in 1932, after reaching 108·1 in 1930. In 1933 the index number had recovered slightly to 64·6.

It might be expected that, by and large, companies in the same line of business would show approximately the same trend in their trading results. Generally, a major trend upwards or downwards in profits is shown by the majority in a particular group or industry, but much depends on the individual situation of the company concerned. It is possible that owing to its poor financial situation a company might be unable to take hold of opportunities offering. Other possibilities also arise: *e.g.*, a company, owing to being engaged to capacity, might be unable to accept more profitable orders on account of its inability to deliver when required. The rise and fall in wholesale prices must sooner or later affect all manufacturing companies, but its incidence in a particular financial year depends on the stocks of raw material carried and the amount of business in hand. Particularly is this the case when a major adjustment in prices takes place towards the close of a company's financial year.

In his book *National Income and Outlay*, Mr. Colin Clark refers (page 128) to the fact that "measured as a percentage on turnover, profits seem to be highest in the chemical and allied trades, food, drink and tobacco trades, the paper and printing trade, and miscellaneous manufactures. Measured as a percentage on the wages bill, the same four groups of industries are found to give the highest profits; in other words, these are the industries in which capital

gets the highest and labour the lowest share of net output." Unfortunately, it is not possible to test this statement from an examination of the Companies' Accounts received, as the necessary information is rarely, if ever, disclosed. His reference to the effect of abnormally high or very low advertising expenditure on profits does not, of course, apply to the figures presented here, as they are based on the Net Profits as shown by the various companies' own accounts, whilst the profits appearing in Tables 56 and 57 of his book are based on the Census of Production, 1930, and the Import Duties Act Enquiries, 1933 and 1934.

The statement on p. 131 that "the period from 1930 to 1933 was at any rate one of decline, from 1933 to 1934 one of rapid increase in profits. The increase in the profits of the iron and steel industry . . . is noticeable. There was also a considerable increase in the profits of the chemical group of industries. In the textile industries the recovery of output and profits appears to have come much earlier than in most other industries, at the end of 1931. Profits had recovered to 10 per cent. on turnover in 1933, and showed a slight decline in 1934. The same applied to the leather industry," is borne out by the indices given in Table I, so far as they are comparable, where the index number of "All Classes" was 86.2 in 1933 as against 100.0 in 1930, and rose sharply to 105.5 in 1934. It will be noted, however, that although 1933 showed a decline as compared with 1930, it showed an increase as compared with 1932 (72.4). Mr. Colin Clark, however, did not have information available regarding the years 1931 and 1932—that is, between the Census of Production, 1930, and the Import Duties Act Enquiry, 1933. As regards Textiles, the indices in Table I show that whereas there was a sharp rise in profits in 1931, those for 1932 and 1933 fell below the 1930 level, although 1933 was slightly better than 1932. Considerable recovery was, however, shown in 1934.

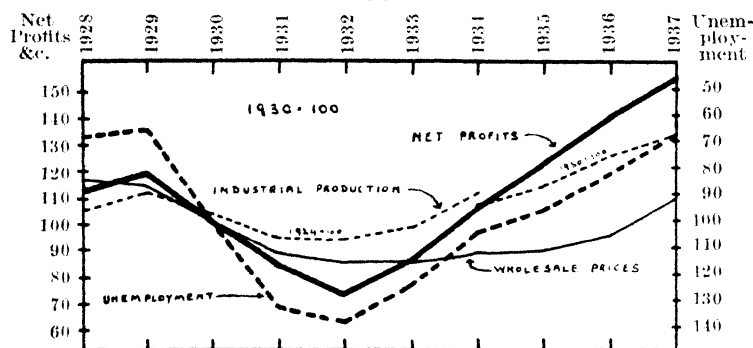
It is interesting to compare the Indices of Net Profits for "All Classes" with the Board of Trade Indices for Wholesale Prices and Industrial Production, and with Indices for Unemployment for Great Britain and Northern Ireland. The latter indices are based on 1930 = 100, and have been calculated from the average percentages unemployed among the insured persons as given in the "Twenty-second Abstract of Labour Statistics of the United Kingdom (1922–36)," and brought up to date from the *Ministry of Labour Gazette*. In Chart III the Indices of Unemployment have been inverted.

The figures from which Chart III has been prepared are tabulated on the following page.

In Chart III it will be noticed that from 1929, when Net Profits and Industrial Production were apparently increasing (and

Unemployment decreasing), thereafter until 1932 (when "bottom" was reached) there was a severe decline, though showing varying rates of declivity in the indices represented. It should be mentioned in the case of Wholesale Prices that, with the exception of the year 1924, there had been a steady decline since 1920. From 1932 onwards there was a noteworthy recovery to 1937. It will be noticed that the curve for Net Profits follows much more closely the curve for Unemployment. Also that the rate of increase in Unemployment and extent of increase, was greater than the decline in Net Profits.

CHART III



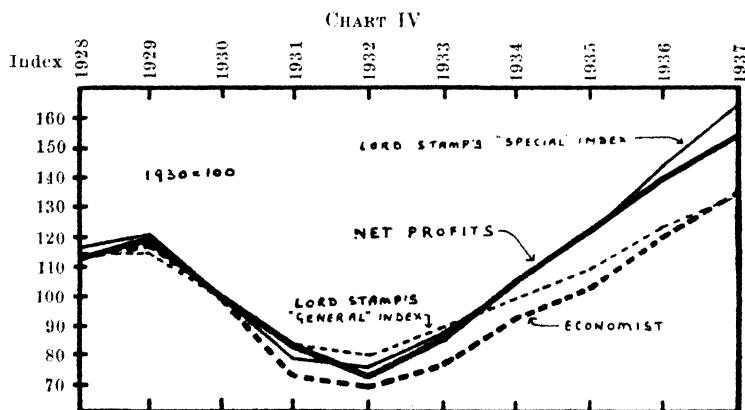
	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937
Unemployed :										
Average Percentages	16.8	16.4	16.1	21.3	22.4	19.9	16.7	15.5	13.2	10.9
Index (1930 = 100)	67.1	64.6	100.0	132.3	137.3	123.6	103.7	96.3	82.0	67.7
Index of Net Profits (see Table I) (1930 = 100)	112.6	119.6	100.0	83.4	72.4	86.2	105.5	122.4	139.9	153.8
B.O.T. Wholesale Prices (1930 = 100)	117.4†	114.2‡	100.0	87.8	85.6	85.7	88.1	89.0	94.4	108.7
B.O.T. Industrial Production ... }	105.5°	111.8°	103.2°	93.7°	93.3°	98.6°	110.8°	113.6†	124.6†	133.1†

° 1924 = 100. † 1930 = 100. ‡ Calculated from base 1913 = 100.

It is very doubtful, however, whether any great significance can be attached to the similarity between the curves for these two indices, for when applied to several of the individual industries it was found that this similarity did not exist—*e.g.*, in Coal-mining. In the same way it is difficult to compare the results for individual classes with Indices for Production (*e.g.*, Beer, Coal, Iron and Steel, Building etc.). The fact is that collectively the indices for Net Profits show a trend similar to other well-known indicators, but when investigations are made into the various industries, other considerations than price and production must be taken into account—namely, profit margin and prudence. Undoubtedly a major trend upwards or

downwards cannot be concealed, but it is a fairly common practice for companies to husband their resources in good years in order that they may be able to supplement the poorer results of lean years, whether or not the facts are disclosed.

Mention should here be made of the very valuable work performed by Lord Stamp of Shortlands in this field. In his *National Capital and other Statistical Studies* (1937), II, is reprinted the presidential address given before this Society on "A New Index Number of Profits" (see *Journal* for 1932). These figures have since been brought up to date by him and published in the form of letters to *The Times* (for the latest, see *The Times*, September 1st, 1938). (The General Index is designed to show the fluctuations in the total return to industrial capital, including debenture and other relatively immobile yields. The Special Index shows the more sensitive return on ordinary capital.) In order to compare them with the Indices of Net Profits given in this article the liberty has been taken of converting his figures on to a base of 1930 = 100. The *Economist* also publishes a Chain Index Number based on 1928 = 100. The index is prepared from company reports received by that Journal in the four quarters ended June 30th and are, by and large, the profits earned by British industry in the previous calendar year. These indices for purpose of comparison have been converted on to a base of 1931 = 100. (See the *Economist*, Vol. CXXXII, No. 4951, July 16th, 1938.*) The results are shown in Chart IV.



* The *Economist* figures relate to a varying sample of companies nearly all of which are registered in the United Kingdom, but the operations of which are not necessarily confined to this country. Profits consist of net earnings after deduction of debenture interest, etc. Lord Stamp's General Index represents a combination of *Economist* data with the figures of profits assessed to Income Tax, whilst his Special Index is compiled from *Economist* data alone.

The figures from which Chart IV has been prepared are as follow :

	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937
Index of Net Profits (see Table I) (1930 = 100)	112.6	119.6	100.0	83.1	72.4	86.2	100.5	122.1	139.9	153.8
Lord Stamp's Indices (base 1924 = 100) :										
Special	110.7	114.3	94.4	74.3	71.4	82.6	98.8	114.0	136.0	155.5†
General	106.2	106.8	92.8	77.4	74.2	82.7	91.5	101.0†	114.0†	126.0†
Lord Stamp's Indices (converted to 1930 = 100) :										
Special	117.3	121.1	100.0	78.8	75.6	87.5	101.7	120.8	144.1	164.7†
General	111.1	115.1	100.0	83.4	80.1	89.1	98.6	108.8†	122.8†	135.8†
<i>Economist</i> * Indices (base 1928 = 100)...	102	106	90	66	62	69	83	93	108	122
Converted to 1931 = 100)	113	118	100	73	69	77	92	103	120	136

* Based on reports received in years ended June 30th of following years.

† Provisional, subject to early verification.

‡ Very provisional.

The very close comparison between the Net Profits Index given in this article and Lord Stamp's Special Index is noteworthy, especially up to the year 1935. The sharper upturn in Lord Stamp's Special Index in 1936 and 1937 is undoubtedly due to the fact that his index shows the return on Ordinary Capital, whereas profit available for Preference Capital is included in the Net Profits Index. It also tends to confirm the earlier statement that although the sample taken is very small, it is "probably adequate to give an indication of the trend," for Lord Stamp's indices are based on a considerably greater number of companies. It must be borne in mind, however, that his indices include certain industries which are excluded from the Net Profits Index given in this article.

In the construction of an Index of Net Profits, and in the use which can be made of such an index, there are several considerations, apart from those previously mentioned (viz., Industries to be excluded, Debenture Interest, Loan Interest, Holding Companies, etc.). One question that is difficult to answer is: To what extent does the valuation of stock affect the calculation? In a period of falling prices of raw materials directors would be more likely to place an ultra-conservative valuation on their company's stock. If in the next financial year prices are recovering, and the tendency is likely to remain upward, the chance is that there will be quite a considerable "profit" from stock valuations alone which is not strictly "trading" profit. It would seem, therefore, that in a period of falling raw-material prices profits may be unduly depressed by the lower ("market") value given to stock, whilst when the corner has been turned the subsequent year will gain by the more optimistic

outlook as regards stock values. The effect of this on an Index of Net Profits cannot be measured.

Further difficulties which arise are in connection with capital employed. In this article no account has been taken of differences in capital employed by a particular company during the ten-year period covered. It is possible, therefore, that a company may have considerably increased its capital between 1928 and 1937. This may have occurred in many ways, and for a number of objects. It does not necessarily follow, however, that because a company has increased its Issued Capital, the capital employed in the business has increased. In the past few years it has been a common practice to declare capital bonuses out of Reserves or accumulated profits. Conversely, a company may have increased its Working Capital available by "ploughing back" profits earned, without increasing its Issued Capital. In other cases money has been raised by share issues to acquire additional business; or the settlement therefor may have been made by an issue of shares to the vendor. The effect of these latter capital transactions on profits cannot be estimated or calculated, but it is conceivable that enhanced profits in subsequent years are due to some extent to the acquisition of new business. Purchases of new business do not always, however, take place when the return on the investment is likely to be the most profitable (although this is more likely), but may and do arise in times of recession, owing to a competitor being forced out of business and being "bought up" by a stronger concern with a view to increased custom when trade revives.

Another item which can affect an index of this nature is depreciation. A company in normal times will probably make an annual charge against profits; however, when times are bad and results are bad too, the question of depreciation may be shelved for the time being, with the result that the true extent of the fall in profits, or increase in losses, is not shown. At a later date the depreciation charge may be made up by a lump sum transfer either from a Reserve, or out of profits in a succeeding year, or by a heavier charge in succeeding years. The treatment of income tax in a company's accounts also requires careful attention.

The question of losses is another difficulty, especially when there are heavy losses to be recorded, particularly in the base year, as the result is that the indices for other years are increased thereby. It should be mentioned that in the tables appearing in this article all losses have been deducted. The investigator also finds from time to time transfers of undisclosed amounts into or out of profits, and these create further difficulties.

Many of these difficulties, and several others, were mentioned

by Lord Stamp in his Presidential Address in June 1932, and no object is to be served by going into them further here. There is one additional matter, however, that should be mentioned, and which affects the value of the total index, and that is whether "weights" should be given to various industry groups. As stated previously, no attempt has been made to apply any system of weighting in the preparation of the index for this article. It is felt, however, that certain groups exert an undue influence owing to there being proportionately too many "exhibits," whilst others exert insufficient weight. For example, in Table I there are thirty-two companies in the "Breweries, Distilleries and Mineral-water Manufactures" group, whilst the "Cotton Preparing and Manufacturing" group is very poorly represented by four companies, one of which far outclasses the others. It is obvious that the great Cotton Industry, therefore, is hopelessly under-represented (and perhaps misrepresented) in the index. The question of applying a system of "weighting" is one of considerable difficulty. Should it be based on Capital? If so, on Shareholders' Capital (including, or not including, free Reserves) or on both Shareholders' Capital and Debentures? Should it be based on earning capacity over a period of years; or numbers engaged in industry; or value of output, as shown by the Census of Production?

A further point when the number of companies in a sample is comparatively small is the weight exerted by one or more particularly large companies. It is quite conceivable that in an industry group of, say, twelve companies, one or two might be exceptionally large and the profits be equal to, or perhaps even in excess of, those of the smaller remaining companies, which may nevertheless be equally important in their own particular branch of that industry. In practice, however, this difficulty is met to some extent by the fact that the exclusion of holding companies rules a considerable number of the largest companies out, their place being taken by several of their associated or subsidiary companies.

Sufficient will have been stated regarding the difficulties encountered in the preparation of an Index of Net Profits to show that the results must be treated as tentative, especially in regard to the individual industries.

It will be realised that the profits of 260 companies represent only a very minute fraction of the profits from commerce and industry. Many important businesses are carried on by private companies or partnerships, and the results are not available for investigation in the same way as those of public companies. The only indication of the profitability of commerce and industry as a whole is from the assessments of Schedule "D" Income Tax. These, however,

cover a very much wider field than has been attempted here, and they are hardly comparable with the figures now given.

In order to afford some sort of comparison the collecting of data was carried on in the same manner on the ten-year basis, and subject to the same qualifications, for years ended on January 31st, February 28th, March 31st, April 30th, May 31st and June 30th. The number of Reports applicable to this analysis received for years ended on January 31st, February 28th, April 30th, and May 31st was insufficient to afford any sound basis for calculation of an index number, but for years ended on March 31st and June 30th some 127 and 75 Reports, respectively, came to hand up to the end of August * and end of October, respectively, and have been analysed under the four main groups—viz., Food, Drink and Tobacco; Textiles; Coal, Iron and Steel, and Engineering; and Others. Unfortunately, in the Textile group the base year shows a loss in each case, thus making the calculation of an index impossible. The indices for each of the ten years ended March 31st and June 30th, have been calculated on the years ended March 31st, 1931, and June 30th, 1931, respectively. In Table II the indices for years ended on March 31st and June 30th (1929–38) are compared with those for years ended on December 31st (1928–37), and are divided under the above-mentioned headings.

A study of Table II reveals one or two points of interest which are material when considering and comparing the indices for "All Classes." It will be noted that for years ended on June 30th, the Class "Food, Drink and Tobacco" although represented by 18 out of a total of 75 companies, claims almost 50 per cent. of the total Preference and Ordinary Share Capital in 1938, whilst Net Profits in the base year (1931) were five-sixths of the whole and in 1938 about four-sevenths of the whole. The indices in this class do not exhibit the same increases between 1933 and 1937 as shown by the "Coal, Iron and Steel, and Engineering" and "Others" groups, and it is due undoubtedly to this fact, through the "weight" exerted, that the divergency in trend is shown in the total indices for June 30th when compared with years ended on December 31st and March 31st in the years 1934–35 and 1935–36.

Whereas the results for December 1937 disclosed a still rising trend, except in Textiles, those for March 1938 showed a "flattening out" when considered as a whole. Actually there was a decline in groups other than "Coal, Iron and Steel, and Engineering," which still showed a considerable increase. For June 30th, 1938, however, a definite downward trend is shown in all groups and in the total. Chart V compares the trend of the total indices over the ten-year

* Between the end of August and end of October a further nine Reports were received in respect of years ended on March 31st.

TABLE II
*Indices of Commercial and Industrial Net Profits for Years Ended March 31st and June 30th, 1929-38,
 Compared with Years Ended December 31st, 1928-37*

Base 1939 or 1931 = 100

Year Ended	Class	No. of Com- panies	Prof. and Ord. Share Capital at end of period (1937- 38)	Net Profits in Base Year (1937- 31)	Net Profits in 1937 or 1938	Net Profits after Taxation, Depreciation and Debenture Interest.											
						1928- 29	1929- 30	1930- 31	1931- 32	1932- 33	1933- 34	1934- 35	1935- 36	1936- 37	1937- 38		
June 30th	Food, Drink and Tobacco	18	(£000)	(£000)	(£000)	99.9	110.8	100.0	74.6	65.9	77.1	84.1	87.0	86.6	80.6		
Mar. 31st	"	27	29,481	5,044	4,068	116.5	111.6	100.0	93.3	87.6	98.0	101.2	109.8	116.1	113.5		
Dec. 31st	"	50	22,748	2,379	2,701	100.5	106.9	100.0	81.2	59.8	77.5	89.5	96.4	99.2	101.4		
June 30th	Textiles	10	9,658	87.4	84	•	•	•	•	•	•	•	•	•	•		
Mar. 31st	"	10	18,694	280.4	233	•	•	•	•	•	•	•	•	•	•		
Dec. 31st	"	21	13,872	656	863	212.3	199.2	100.0	130.9	95.3	97.1	110.5	119.3	155.3	131.5		
June 30th	Coal, Iron and Steel, and En- gineering	29	12,370	447	1,590	106.4	188.3	100.0	73.1	80.0	160.5	186.8	258.3	389.4	359.7		
Mar. 31st	"	41	39,710	1,842	5,217	125.5	150.0	100.0	84.5	100.2	127.8	163.6	211.1	248.9	283.3		
Dec. 31st	"	68	73,067	4,246	10,727	97.5	122.2	100.0	80.7	80.9	90.3	127.9	161.9	204.8	252.6		
June 30th	Others	27	9,781	656	1,145	115.6	103.8	100.0	99.1	96.9	122.2	139.4	156.6	184.0	174.6		
Mar. 31st	"	49	37,030	4,557	6,732	105.2	113.2	100.0	92.5	96.3	112.8	124.8	140.0	163.7	147.7		
Dec. 31st	"	121	66,892	5,425	6,901	123.3	119.6	100.0	81.0	74.5	89.8	102.1	114.9	124.8	127.2		
June 30th	All Classes	75	61,590	6,060	6,857	119.1	123.2	100.0	84.6	76.8	96.3	103.1	111.8	128.6	113.1		
Mar. 31st	"	127	118,182	8,498	14,983	132.0	136.3	100.0	93.9	98.8	117.9	132.5	155.0	174.4	176.3		
Dec. 31st	"	260	194,732	15,312	23,516	112.6	119.6	100.0	83.1	72.4	86.2	105.5	122.1	139.9	153.8		

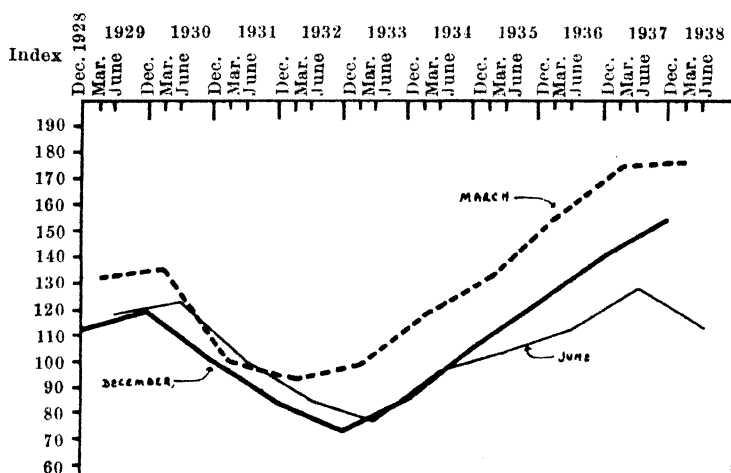
* It is not possible to show indices for "Textiles" for years ended on March 31st and June 30th, owing to the fact that the base years showed a net loss.

† Loss.

period. The curves have been slightly "staggered" for the sake of clarity.

In conclusion it may be stated that there is one limitation to the usefulness of indices of this kind in the time which elapses between the end of a company's financial year and the issue of its accounts. Normally, the bulk of accounts are issued between the second and fourth months after the end of the period to which they relate, whilst only a few are available in the first month. It may be taken as a fact, however, that all important industrial and commercial concerns, with one or two exceptions, issue their accounts within

CHART V



a period of five months. The issue of indices calculated on the published results of trading must therefore, in the nature of things, be deferred until a period at least four, if not five, months after the accounting period to which they refer; thus the value of such indices is limited to their consideration in retrospect and a large part of their possible usefulness is lost. It seems to the present writer that, even so, some useful work could be done in the careful analysis of company results over a period of years and by groups of industries, attention being also paid to items not within the scope of this present article—namely, movements in stock, amounts placed to reserves, amounts paid in cash, by way of dividends, to shareholders, etc.

The advantages and disadvantages of the publication of quarterly statements have often in the past been discussed in the Financial Press and elsewhere, and without entering into argument as to whether publication would be of benefit to shareholders, members of the Stock Exchanges and the investing public generally, it can be

stated that the prompt publication of quarterly statements would probably be of advantage in assisting to ascertain, subject to the qualifications mentioned in earlier pages, the industries affected adversely or otherwise by changes in commodity prices, internal and external trading conditions, etc., thus providing additional information and giving some indications of measures necessary to keep a balanced economy.

A further point of considerable advantage to those whose lot it is to follow the changes and trends in company earnings by industries would be the closing of the accounts of all industrial and commercial undertakings on a common date, preferably December 31st, for the sake of comparison with other indices. It would seem unlikely, however, that this would be carried through except by Act of Parliament. In the case of plantation and certain other classes of companies closely connected with agriculture in one form or another, it is realized, of course, that December 31st would probably not be a suitable date. A good case for the closing of accounts on a date other than December 31st could probably also be made out for certain other groups, but it would be an undoubted advantage if, as a first step, companies in a particular group or class could be persuaded to close their accounts on a common date.*

If such a practice was ever given effect to it would, of course, place a most considerable burden in the early months of the year on those whose duty it is to record the financial results of commercial enterprise—*e.g.*, the Financial Press, Statistical Services, etc.—and would leave the later months of the year rather “barren”; but if quarterly accounting were introduced, the recording of this information would more than compensate.

It may be of interest to state that between January 1st and October 31st, 1938, some 3,552 Reports were received by the Exchange Telegraph Company, Ltd., relating to financial periods ended in 1937 or 1938. After eliminating companies whose accounting periods did not conform to the principles laid down as the basis for this article, and those to be excluded as not coming under the heading of “Commercial and Industrial,” the following number were accepted for analysis on the ten-year basis adopted:—

Accounts Ended on :	Number of Reports Analysed	Accounts Ended on :	Number of Reports Analysed
Dec. 31st, 1937	260	Apr. 30th, 1938	27
Jan. 31st, 1938	42	May 31st, 1938	14
Feb. 28th, 1938	22	June 30th, 1938	75
Mar. 31st, 1938	127		

* As, for example, many Departmental Stores already do—on January 31st in each year.

Finally, it gives me much pleasure to express thanks to my Company, The Exchange Telegraph Company, Ltd., for allowing me to use the records from which this article has been prepared. It may be added that the Company is in no way responsible for the compilation and presentation of the figures and charts contained herein, or for the views expressed.

THE NEW INDEX OF AGRICULTURAL PRICES

By R. J. THOMPSON, C.B.

THE Ministry of Agriculture has now issued a pamphlet (*Index Number of Agricultural Prices*, Stationery Office, price 9d.) containing the new series of index numbers which were the subject of the paper read before the Society by Mr. C. T. Houghton in January 1938.

Some introductory observations give a general explanation of the purposes of the index. It is pointed out that the income obtained by farmers from their productive operations is governed by a variety of factors, among which the quantities of produce sold, the prices obtained for it, and the costs incurred in producing it are the most important. The index number is concerned with only one of these factors. It is intended as a summary statement of the net effect on farmers' receipts of a great variety of individual price changes. It does not attempt to measure the effect of the changes in quantities produced or in costs of production, and is therefore not intended as a record of actual changes either in the gross or the net income of farmers. Although this is obvious to anyone acquainted with the subject, it is a point which is often lost sight of, with the result that the index number is frequently regarded as an indication of the relative prosperity of the farming industry.

The changes in the method of calculating the annual index were explained in Mr. Houghton's paper. They consist mainly in (a) the substitution as the base period of the years 1927-29 for the years 1911-13; (b) the use for weighting purposes of a moving five-year average; (c) the addition of a few commodities to the products included; and (d) some rather important alterations in the quotations of prices used. The effect of these alterations is seen in the following table, which shows how the old series of index numbers compares

	Old Series (adjusted)	New Series	Old Series (incl. Govt. pay- ments)	New Series
1927	99	99	—	—
1928	101	102	—	—
1929	99	99	—	—
1930	92	91	—	—
1931	83	83½	—	—
1932	77	80½	79	81
1933	74	75½	77	77
1934	79	77	82	78½
1935	81	78½	85	81
1936	84	80½	88	82½
1937	92	89	94	90½

with the new when adjusted for corresponding years. It also shows the new index revised to take account of Government payments for milk, wheat and cattle (Base 1927-29 = 100).

Looking at the figures in the first two columns, the maximum variation between the two series in any one year is $3\frac{1}{2}$ points, but, curiously enough, the variation is not uniformly in one direction : in 1932 the new series is $3\frac{1}{2}$ points higher than the old, while in 1936 it is $3\frac{1}{2}$ points lower. In the same way, the difference from year to year in the new index is sometimes greater and sometimes less than in the old series. The trend is, however, the same in the new index as in the old, though the movement is somewhat less strong : the lowest point was reached by both indices in 1933, when the old index registered 74 and the new $75\frac{1}{2}$, but whereas by 1937 the old index had recovered by 18 points to 92, the movement in the new index was only $13\frac{1}{2}$ points to 89. In the main the differences are presumably due to the new system of weighting and to price movements among the newly-added commodities, but the alterations in the price quotations used must also have had some influence.

The third and fourth columns of the above table show the result of including the wheat, cattle and milk subsidies. As these subsidies are in effect additions to farm prices, the figures revised in this way give a better indication than the simple index of price changes as they have affected farmers : for example, the new index for 1937 at $90\frac{1}{2}$ gives a more correct picture of the relative position of the farmer (so far as prices are concerned) than if the simple index is taken at 89.

In addition to the annual general index, the monthly index of prices has also been revised, and is now issued in a double series. The first measures actual price changes and compares the monthly price with the average annual price in the base period 1927-29. The second is an index from which normal seasonal movements have been eliminated by the use of a moving average. The effect of including the Government subsidies is also shown in each case. An explanation of the method is given in the pamphlet, together with complete tables of the various indices, the prices and weights used and other particulars.

It is proposed that index numbers for fertilisers and feeding stuffs should also be computed on similar lines, but further enquiries are necessary before this can be done.

THE INTERNATIONAL INSTITUTE OF STATISTICS

By A. L. BOWLEY.

THE International Institute of Statistics met at Prague on September 11th for its XXIVth Session, under the Presidency of M. A. Julin. The attendance was numerous and from many countries, but no members appeared from Germany or (former) Austria. The Inaugural Meeting was duly held, the members being welcomed by M. Kalfus, the Minister of Finance. Sectional meetings took place on the afternoon of September 12th and the morning of September 13th, and a full meeting on the afternoon of Tuesday, September 13th. That night the Bureau held a special meeting at the Hotel Alcron and decided at midnight to suspend the Session. On the 14th the members scattered.

Owing to the interruption of the Session, no election of officers took place and no decision was reached as to the place of the next Session.

The Programme of the Session had been as in the following list. The papers marked P. are already printed in the *Revue de l'Institut International de Statistique*; these and others marked S. are deposited in the British Library of Political and Economic Science (the London School of Economics); those marked M. were not available.

ORDRE DU JOUR DE LA SESSION

Séance Plénière

- P. W. Winkler : La baisse de la natalité, ses causes, et ses conséquences économiques et sociales.

*Première Section**Rapports :*

- P. M. Huber : Rapport sur les travaux préparatoires à la V^e révision décennale de la nomenclature internationale des causes de décès.
- P. W. Böhmert : Quelle peut être la contribution de la statistique à la solution du problème du cancer ?
- P. H. Bunle : Rapport de la Commission pour la définition de la "population rurale" (avec la communication y relative : La population rurale. Sur l'adoption d'une définition susceptible d'être internationalement adoptée).
- S. A. Molinari : Statistiques du tourisme international. Rapport de la Commission de la Statistique des migrations.

Communications :

- S. L. de Berardinis : Les infirmes dans les recensements de la population.
- P. E. F. Wagemann : L'utilité de la statistique pour la science médicale.
- S. H. L. Dunn : Comparabilité internationale des statistiques des causes de décès.
- S. M. L. H. Meyer : La statistique allemande des malades cancéreux.
- M. L. Livi et G. Parenti : Les probabilités de décès par état matrimonial.
- S. A. Boháč : Le problème de la distinction de l'artisanat et de la grande industrie dans le classement des professions.
- S. J. Auerhan : De la relation entre le milieu géographique et la taille des conscrits.
- S. C. Horáček : Remarques sur les rapports entre la baisse de la natalité et le développement des conditions économiques.
- S. J. Janko : Le taux annuel d'accroissement de la population.
- M. V. Kořínek : La formule de Rahts pour la probabilité de mort, sa démonstration et sa validité.
- S. P. Smutný : Méthode-frontière dans la statistique du tourisme.

*Deuxième Section**Rapports :*

- P. Sir Alfred W. Flux : La mesure statistique des changements dans l'outillage national.
- S. A. Molinari : Deuxième rapport sur les statistiques de la distribution.

Communications :

- P. E. F. Wagemann et R. Wagenführ : Statistiques économiques hebdomadaires et leur signification pour l'observation économique en Allemagne.
- M. F. Savorgnan et L. Amoroso : La dynamique des phénomènes collectifs.
- S. R. Meerwarth et Ch. Lorenz : Méthode et valeur d'un indice général de la consommation.
- S. M. Huber et H. Ulmer : La statistique agricole dans certains pays où elle présente des difficultés particulières (spécialement les pays coloniaux).
- S. V. Dore : Le recensement agricole mondial de 1940.
- S. H. Marshall : Le recensement de la distribution au Canada.
- S. M. Horna : De la perceptibilité des déséquilibres monétaires au moyen de la statistique.
- M. A. Král : De quelques problèmes sur la balance des capitaux.

*Troisième Section**Rapports :*

- S. A. Molinari : Institutions statistiques dont l'organisation relève de la décentralisation horizontale (Groupe de langues latines).
- M. S. A. Rice et R. O. Lang : L'organisation des services statistiques aux Etats-Unis d'Amérique et en Grande-Bretagne.
- S. W. Winkler : L'organisation des services statistiques. Rapport sur les pays à organisation statistique par centralisation partielle.
- P. Ph. J. Idenburg : Directives pour l'élaboration des statistiques de la radio-diffusion dans les divers pays.
- P. B. Nyström : Commission de la statistique des nouvelles constructions et de l'habitation. Rapport préliminaire.
- P. J. H. van Zanten : Les bases de comparaison du nombre des accidents de la circulation routière.

Communications :

- M. V. Castrilli : Coordination internationale des statistiques universitaires. Origine sociale des étudiants.
- M. L. Livi : Essai d'un calcul du risque d'accident des conducteurs de véhicules automobiles et des passagers.

*Quatrième Section**Rapports :*

- P. K. Drexel : L'uniformité dans les limites des groupes statistiques.
- S. H. Platzer : La statistique et la réforme du calendrier.

Communications :

- S. M. Hecht et P. Flaskämper : La valeur des mathématiques pour la statistique et ses limites.
- M. J. Korčák : Les deux types fondamentaux de distribution statistique.

REVIEWS OF STATISTICAL AND ECONOMIC BOOKS.

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1.—*Wahrscheinlichkeit, Statistik and Wahrheit.* By R. von Mises, 2nd, improved edition, Vienna: Julius Springer. 1936. 8 $\frac{3}{4}$ " \times 5 $\frac{3}{4}$ ". viii + 282 pp. 16 RM.

This is an improved edition of Professor von Mises' classic, which was first published in 1928, nine years after the author originally expounded his views on the fundamentals of the theory of probability in the *Mathematische Zeitschrift*. The voice of criticism had already been heard by the date of the first edition: but after that it rose to a chorus, gathering strength and volume as the concept of probability acquired importance in the theory of nuclear physics and wave mechanics. Almost every point of von Mises' theory has been subjected to attack from some point of view or other. But his head is unbowed. In this second edition he completely reaffirms his creed, and deals at some length with the criticisms which it has evoked. Whether his replies to his critics are always convincing is a matter of opinion; but they are always worth reading.

The main lines of the book remain the same as in the first edition. The first chapter is devoted to an analysis of the idea of probability, and reaches the conclusion that a satisfactory theory must be based on frequencies of observed events. The second shows how such a theory may be constructed. The third is a critique of the fundamental ideas, and contains the reply to criticisms referred to above. The fourth deals with the so-called Laws of Large Numbers. The fifth and sixth discuss applications of the theory to statistics, the Theory

of Errors and the problems of statistical physics. There are practically no mathematics; von Mises succeeds in saying what he has to say in words without serious loss of precision and with much gain in readability.

The fundamental concept in von Mises' theory is that of an infinite ordered aggregate called a "*Kollektiv*." For simplicity it is convenient to concentrate on a series of two different characteristics only, which can be pictured as an infinite sequence of zeros and ones. Von Mises assumes as properties of this *kollektiv* :

(a) That as n , the number of digits, increases, the proportional frequency of zeros (or of ones) tends to a limit. This limit he defines as the probability of the zero (or of the one) in the *Kollektiv*.

(b) That if any infinite sub-set is picked out from the *kollektiv* by a method independent of the value of the member being chosen, the proportional frequency of zeros (or of ones) in this sub-set also tends to the same limit. This is the concept of Irregularity (*Regellosigkeit*).

Most statisticians would probably acquiesce in the first assumption, and even those who do not usually find themselves compelled to make it in practical applications. *Kollektivs* satisfying this restricted requirement exist, and can be completely specified by a law of formation. But the second offers the most difficult problem of the theory of probability at the present time. For one thing, it is impossible to give any law of formation to specify an Irregular *Kollektiv*, for that law itself could be used to pick out a sub-set which disobeys the assumption. Nor can we construct an infinite series in a finite lifetime. In what sense, then, can the Irregular *Kollektiv* be said to exist? The nearest approach to an existence theorem has been made by A. H. Copeland, who has proved that for a restricted type of sub-set selection, depending on the ordinal number of the chosen digit, *kollektivs* do exist in infinite amount. But this proof in itself requires the "existence" of the arithmetic continuum—a problem which raises much the same difficulty as the existence of the Irregular *Kollektiv*.

The Irregular *Kollektiv* is, in fact, that elusive entity, the infinite random series. Anything finite may happen in it at any point, and everything must happen sooner or later. It is the negation of all law, but it is subject to law. Its essence is chaos, but its sub-sequences tend to limits. It repeats itself over and over again, but it is not periodic. Age cannot wither it nor custom stale its infinite variety: but, all the same, von Mises can get a master-hold on it and force it into service in founding his theory of probability.

It is hardly surprising that this mystical concept has repelled a number of mathematicians and philosophers. Some have attempted to build a theory on finite *kollektivs*, only to come to grief in practical applications. Others, notably Kolmogoroff and Cramér, have tried to avoid the whole difficulty by making the theory of probability a branch of the theory of additive set functions. Von Mises' reply to

this is that we can equally well make hydrodynamics a branch of the theory of differential equations, but how far does that get us in understanding the nature of fluid motion?

Finally, some workers have tried to show that the idea of the Irregular Kollektiv is self-contradictory. Von Mises says that no attempts of this kind have been successful. He refers to the work done by Dörge (1934) on the mathematical foundations of his theory, and considers, in words which are worth quoting for the grandeur of the original German :—

“Die Dörgeschen Untersuchungen seien ein Weg, die Widerspruchsfreiheit der auf Häufigkeitsdefinition und Regellosigkeitsbegriff aufgebauten Wahrscheinlichkeitstheorie zu beweisen.”

This appears to the reviewer to claim too much. Dörge's work, interesting as it is, leaves certain difficulties in von Mises' fundamental ideas to be resolved only by axioms and postulates. And in fact it appears to be possible to find a contradiction as follows :—

Let us suppose that the proportional frequency of zeros in the Irregular Kollektiv tends to a limit p . All we know about p , and all we need to know for present purposes, is that it is a number not less than 0 and not greater than 1. The tending to the limit, be it noted, is a tending in the mathematical sense. It is not a process which can be called “stochastic” or by any of the other words which have been invented to conceal the real point at issue. Nor is it “almost certainly” a limit. Given any ε there is a number N such that the proportional frequency of zeros in the first n members of the kollektiv differs from p by less than ε for all n greater than N . Let us take $n = 2N$. Then the proportional frequency in the first $2N$ differs from p by less than ε , and hence the number of zeros is less than $2N(p + \varepsilon)$.

Now, a statement of this kind asserts something about the impossibility of a run of zeros. If the first N members contain q zeros, the next N cannot contain $2N(p + \varepsilon) - q$ zeros or more. And this is contrary to the whole idea of the Irregular Kollektiv, in which the occurrence of any sequence is independent of any preceding sequence. The only way round this contradiction seems to be to beg the question by modifying the meaning of “tending to a limit.” Another possibility—that of denying that the kollektiv has a beginning—is ruled out by the requirement that it shall be denumerable.

If we require that the limiting inequality shall hold for “almost all n ”; or if we assume that the probability that the proportional frequency shall differ from p by less than ε tends to zero with large n , we have the same difficulty over again with a kollektiv of kollektivs. Dörge (and nobody can say that the von Mises school refuses to face its difficulties) gets over this trouble by introducing a new idea called “chance,” which is different from probability. The distinction is too subtle for me. If a random series of kollektivs is required to explain the irregular kollektiv, then a random series of such series is

also required, and so on. Where this takes us, and what becomes of the experimental evidence in favour of such a state of affairs in nature, it is impossible to see.

Von Mises supports the plausibility of the concept of the Irregular Kollektiv by pointing out that nobody has succeeded in finding a system to break the bank at Monte Carlo. He calls the Principle of Irregularity "das Prinzip vom ausgeschlossen Spielsystem." This again appears to be misfounded. If, say, the relative frequencies of red and black in roulette tended to limits mathematically, certain long runs would become impossible, and it would be quite easy to break the bank by "doubling up," provided (a) that there was no limit to the stake, (b) the player had large (but not infinite) capital resources and (c) that play went on continuously. In actual fact it is precisely the absence of these provisos, combined with human idiocy, which preserves the solvency of Monaco.

It must be admitted that von Mises' opponents have fared no better than he in providing a satisfactory basis for the theory of probability. The difficulties remain unsolved. If he has failed to make out a completely convincing case for his own point of view, he is at least in good company, and the fact by no means detracts from the value of this book. In certain directions von Mises' contributions undoubtedly have permanent value. His insistence that probability must be considered in relation to a kollektiv; his exposition of the Laws of Large Numbers; his treatment of the Principle of Uncertainty in physical measurements—these and many other topics dealt with in the book should be missed by nobody with scientific interests. He is fair to his opponents, and tries to state their views adequately, and in consequence the book is a very readable all-round account of the philosophical difficulties of the concept of probability and the practical difficulties of applying it to scientific inference. Some idea of von Mises' breadth of view can be obtained by a glance at the index of authors' names. Tacitus rubs shoulders with Todhunter, Freud with Fréchet, Bergson with Bessel. The authorities referred to range from Goethe, whose views on most scientific subjects are worth knowing, to Kant, whose are not.

Someone should translate this book into English.

M. G. K.

2.- *The Assessment of Psychological Qualities by Verbal Methods.* A Survey of Attitude Test-Rating Scales and Personality Questionnaires. By P. E. Vernon. Industrial Health Research Board Report No. 83. London: H.M.S.O. 1938. 9 $\frac{3}{4}$ " x 6". 132 pp. 2s.

In conversation the author said that he had deliberately avoided mathematical expressions and derivations, and expressed some surprise that a review of his report could be of interest to statisticians. The main difficulties in reviewing this admirable report are that it presents very clearly an enormous amount of material in an extremely condensed form, and that few of the 237 paragraphs fail to raise matters of statistical importance. Following the introduction there are five main sections dealing with Group surveys of attitudes and interests; Tests and scales for measuring attitudes of individuals;

Assessment of human traits by ratings; Self-ratings and personality questionnaire tests; Word association methods and interest blanks. In the last section the author sums up and draws his conclusions.

It is noticeable that most of the techniques mentioned call for further development. Voting, rating, ranking, and paired comparisons are taken first. It is rather surprising that the short section on voting makes no reference to P. R. Rating introduces a number of difficulties. Two of them are due to differing standards: when some raters adopt a higher average rating than others, or when some use more extreme ratings than others. On a further point, where the average intercorrelation between raters is low, the author says that the resulting averages will not differ much, and recommends that the dispersion of the ratings be arbitrarily increased. This procedure seems unjustified if the intercorrelations are so low that the resulting averages do not differ significantly, and in any case low dispersion is an important feature of the situation. Ranking is open to the objection that it assumes a "highly artificial distribution of items" (rectangular). It is, however, worth noting—what is not mentioned—that the greater difficulty experienced in ranking items in the middle of a group is not necessarily an indication, as suggested, that the differences are smaller there than at the ends. This can be demonstrated by ranking items known otherwise to differ by equal amounts. The greater difficulty in the middle of the group seems to be due, there, partly to the fact that the differences available for comparison are only half those between the extreme items.

To return to the report. Paired comparison becomes extremely laborious with groups of even moderate size, and "does not apparently produce any better results than the ranking technique." Thurstone had developed a (very laborious) technique in connection with attitude measurement for converting the results of paired comparisons to "scale values," based on the assumption that the chance of making a wrong judgment about two items is related to their scale separation on an underlying linear continuum by the normal law of error. The advantage claimed is that equal separations have equal values at any part of the scale (which is not true in general of scores of psychological tests). Guilford has devised a short-cut method reaching substantially the same results. Some very interesting applications of this technique are mentioned, such as to determining the effect of propaganda films. The main objection to the procedure is that few attitudes such as "nationality preferences" or "attitude towards the Church" can be regarded as simple linear continua. There are further considerations, not mentioned in the report, that the order of items is unchanged by scaling; there is a very close correspondence between the scale values and the total number of "preferences" given to each item, and it seems that no method is offered for assessing the significance of scale separations.

The twin problems of Reliability and Validity are ubiquitous. It must be difficult for those who are accustomed to making measurements with accurate instruments to appreciate a situation where one has to determine whether one's carefully constructed instruments can be said to measure anything at all, and, if so, whether they measure

what you want them to measure. The report describes methods available for assessing reliability, but validity is seldom a matter of measurement. Much remains to be done by psychologists in clarifying the principles underlying the tests used and in analysing the situations set up by the instructions to those who take them. Related to the foregoing is the question of using external or internal consistency as criteria in the construction of tests, questionnaires, and opinionnaires. The first criterion stresses validity, but has the disadvantage of making the object of the enquiry patent to the subject, who can then fake his answers if he is unscrupulous or indulges in his sense of humour. The second criterion tends to produce high reliability. It is, however, much more difficult to understand the results of a test constructed in this way, since the questions may have no obvious connection with the trait under review and are retained on the empirical grounds that there is correlation between each and the sum of the others in the answers of the subjects used to standardise the test. This empirical method means the cutting out of "dead wood" and subsequent restandardization, an iterative method so lavish in time, money, and services as to be practicable only in the United States.

Factor analysis calls for separate consideration, and here, in attempting to summarize, it would be hard to improve on the report. "In introducing the topic of factor analysis we implied, as do most statistical psychologists, that such analysis would reveal the underlying structure of the personalities to whom our tests are applied, but we can see now that this claim is somewhat presumptuous, and that it would be safer to regard analysis merely as revealing the logical structure of the applied tests." Again, "It is obvious that the factors can only cover those facets of personality which are represented in the test battery," and again, "More fundamental is the objection that, while the test intercorrelations are consistent with the extracted factors, they do not prove that these are the only possible factors." The so-called inverted factor technique is mentioned, and may be summarized thus. Given n persons and m tests, the mn scores may be treated as defining n points in m -dimensional space, or m points in n -dimensional space. Burt claims to have shown that the analysis of the two situations is complementary. Owing to failings in test scores, one method will at times be found more appropriate and more intelligible than the other. Following Spearman's original contribution, there has arisen round factor analysis a vast amount of research, controversy, and finally the beautiful mathematical work of Burt, Hotelling, Holzinger, Kelley, Thomson, Thurstone, and others; but there is distinct risk that the psychologists have been outstripped by the mathematicians.

It would take too long to refer to all the techniques described in the report; surely the author is unduly modest when he says that "they are only a small, though we hope, representative sample." The same trait seems to have prevented him from giving a more than passing reference to the method of matching, to the development of which he has made considerable contributions. This technique "is most suitable for the study of somewhat tenuous indices of personality such as photographs, the voice, gestures, and artistic

style," or, indeed, any case in which we can give a description of each person rather than a score on some trait. Little has been said here about the types of tests used, but it would be a grave omission not to indicate the stress the author rightly lays on the great need for further analysis of the attendant psychological problems. For instance, it is too easy to accept the "measurements" at their face value and to suppose that because in any test the same instructions were given to all subjects, the situation produced in each subject was the same.

One minor criticism is that the bibliography would have been more helpful if paragraph references had been added, as it is not always possible to trace an author to the text by way of the subject index. Of necessity only one aspect of the report has been traced, and incompletely at that. The report as a whole is a most valuable and comprehensive survey of the field. B. B. S.

3.—*A Century of Bank Rate.* By R. G. Hawtrey. London: Longmans. 1938. $8\frac{3}{4}" \times 5\frac{1}{2}" \times + 328$ pp. 10s. 6d.

Perusal of this book set one back to re-reading the first four chapters of Marshall's *Principles of Economics*, to Ricardo's use of the deductive method, and to Marshall's dictum that economic science must "adapt itself closely to the real phenomena of the world; but none the less must it have a firm backbone of careful reasoning and analysis." If economics be "a study of mankind in the ordinary business of life," one would be disposed to expect that a study of facts, and particularly of those which, in the words of our Founders, can be "for the most part arranged in tabular forms and in accordance with the principles of the numerical method," would be a more fruitful source of economic truth than logical deductions from assumptions about human nature. Strife about this matter is perennial, and generally useless, but it has been, on the whole, agreed that the brilliant use of the deductive method by Ricardo yielded conclusions on monetary theory that were sound. Mr. Hawtrey, too, may, broadly though not inaccurately, be described as having been in the past an exponent of pure theory, but now he comes forward with a comprehensive and acute analysis of statistical data in support of his well-known views as to the manner in which monetary influences affect business.

The statistical backbone of the book is Appendix I, in which are shown Bank Rate, price of Consols, and Reserve from September 5th, 1844, to November 9th, 1857; Bank Rate, price of Consols (except that for 1879-89 $2\frac{1}{2}\%$ Annuities are Substitutes), Reserve, increase in Reserve, net imports of Gold, and Interior Demand from December 24th, 1857, to August 8th, 1914; and Bank Rate, price of Consols, Gold in Bank, and Note Issue from July 13th, 1916, to June 30th, 1932. For the whole period covered the successive changes in Bank Rate are shown with the number of weeks for which each was operative. Appendix II compares quarterly from 1857 to 1914, Reserve, increase in Reserve, net imports of Gold, Interior Demand, average Bank Rate, and twelve months' Interior Demand, with the addition of Gold Set Aside from 1899; Appendix III deals with Unemployment, Wage Index, and Interior Demand annually

from 1858 to 1913; Appendix IV gives the discount rate of the Bank of France, from 1820 to 1931; Appendix V shows the principal periods of net Gold Exports in relation to Reserve, Interior Demand, Bank Rate, and Paris Bank Rate; and Appendix VI gives weekly and monthly returns of Gold Imports and Exports from 1858 to 1913.

Mr. Hawtrey's statistical apparatus is elaborate, and one must pay to him a tribute of admiration for the thoroughness and patience with which he has devoted himself to a task involving no small amount of dull labour. In his text he marshals and analyses his statistical material in a masterly way, which gives us, from one angle, a financial history of a hundred years. After a brilliant and brief description of the early financial machinery of Britain, he deals first with the period 1833-1858, when, as is shown by successive Parliamentary Inquiries, the Bank Rate "tradition" was established—that Bank Rate was the means for regulating the currency and controlling credit. That a rise in the rate did so by limiting transactions and reducing prices was a fact subsequently left discreetly in the background. The next two chapters carry on the story from 1858 to 1914 and, in default of official investigations, Mr. Hawtrey has had "to infer motives and policies from the action taken, though a certain amount of guidance is to be derived from unofficial comment," and no doubt he is prepared to be faced with some differences of interpretation. Chapter IV carries the history on through the War and post-War periods to 1932.

The next three chapters, treating respectively of "Bank Rate and Consols," "Long-Term and Short-Term Rates of Interest" and "The Rate of Interest and the Price Level," apply the facts of historical survey and statistical analysis to theory. It would be impossible to attempt to summarize the argument of those chapters without doing injustice to both author and reviewer. Mr. Hawtrey holds that the influence of the short-term rate on the long-term rate is very small, and maintains that the statistical evidence supports his view that working capital is more sensitive to changes in the short-term rate than, as Mr. Keynes holds, fixed capital investment is to the long-term rate. He points out acutely that the long time element in capital outlay diminishes the influence of changes in interest against expectations of profit. It may be suggested, however, that, before we can measure accurately the sensitiveness of working-capital to the short-term rate, one would require to have some idea of the total amount of working capital involved, especially of the amount of traders' capital existing as overdrafts, and also some information as to the rates of return expected by traders in different departments of commerce.

Chapter VIII gives later references to the "tradition" in quotations from sundry monetary authorities, and Chapter IX treats of "Past and Future." Some scattered sentences from this last chapter may give food for thought. "Bank rate can always be used to contract credit if only it be raised high enough. But there is a limit to the power of stimulating an expansion of credit by lowering Bank rate." "A credit deadlock which is impervious to cheap money may yield to treatment through open market purchases

of securities." "The growth of the Government's floating debt has made Bank Rate more indispensable in the regulation of credit than before." But one must stop quoting.

Every author has a favourite child of his brain. We do not know which is Mr. Hawtrey's, and perhaps he will disagree with the opinion that *A Century of Bank Rate* is the most important book he has yet written. But opinion is free. H. W. M.

4.—*Modern Money*. By Myra Curtis and Hugh Townshend. London: Harrap. 1937. $7\frac{3}{4} \times 5\frac{1}{4}$ ". 320 pp. 7s. 6d.

This is a work intended "to describe simply and in outline the working of a modern monetary system," and addressed "both to the general reader interested in the subject and to the elementary student of economics." Its purpose in fact is that of a text-book.

A modern monetary system, as understood by the authors, has two characteristics, the predominant use of bank balances transferred by cheques as the means of payment, and the dissociation of the monetary unit from equivalence to any particular commodity (such as gold). In virtue of the latter condition we must identify modern money with post-war money.

Modern money so delimited is not a very promising subject for a text-book. Monetary history in the past twenty years has consisted of little more than a sad tale of pathological symptoms; monetary policy has consisted of provisional and usually short-sighted expedients. The theorizing of economists upon this material has wandered into devious and eccentric paths, and all their ingenuity has done little to evolve a body of teaching that can properly be laid before the student without infinite qualifications and digressions.

The work that Miss Curtis and Mr. Townshend have produced contains much that is informative and stimulating, but is far from covering the ground in the manner of an adequate text-book. And it suffers from not being well-proportioned. Nearly half the book, Chapters IV–VIII, is taken up with a digression dealing with the motives and mechanism of saving and capital outlay. This is, of course, a subject which requires to be referred to in a work on money. Not only is anyone's cash balance part of his capital, but the passage of resources from the recipient of income, through the investment market, to their final application in capital outlay, affords successive opportunities for the absorption or release of cash.

But the 130 pages devoted to the topic have little to say on these aspects of it. The authors profess themselves to "belong to the school of thought associated with the name of Mr. J. M. Keynes," and accordingly their treatment of interest is based on "liquidity preference." And they involve the notion of liquidity in the same ambiguity as Mr. Keynes; sometimes it is the quality of being "readily realizable in cash" (pp. 19, 34, 141), and sometimes that of being "turned into cash without loss" (pp. 30, 118) or "readily realizable in cash without loss" (p. 46).

A table of what the authors call "money titles" in order of liquidity (pp. 119–20) is inevitably out of trim. Government stocks with or without a redemption date are more "readily

realizable" than time deposits or savings-bank balances. On the other hand, the quality of being realizable *without loss* requires a redemption date, and depends on the nearness of the date. It attaches especially to actual currency or to bank deposits and to mortgages with a clause requiring repayment at six months' notice.

The respective yields assigned by the market to these various types of security form an interesting field of investigation, but one not very closely related to the theory of money. What is relevant to that theory is the power of the monetary authorities to influence economic activity through the rate of interest.

Bank rate is fixed "by the Central Bank at its discretion" (p. 153), and the various short-period rates "follow the Bank rate at different distances" (p. 154). But as to the effect on business and on the monetary situation of the variation of these short-term rates we are left very much in the dark. "Money borrowed from the banks," we are told, "except when it is borrowed for speculation, is normally spent at once on goods and services" (p. 305). (Why the exception? Surely money borrowed for speculation is spent at once.) But though the short-term rate of interest enters into calculations as affecting the cost of carrying stocks of goods, this is so "only to a minor extent in most cases, since a producer's stocks must be mainly governed by the volume of business" (p. 102). The argument seems rather inconclusive, since it leaves out of account the possibility of any change in a trader's judgment as to how many days' requirements he shall keep in stock. Nevertheless the authors seem to be satisfied that the effects of the short-term rate of interest in this direction are unimportant, and they proceed to argue that the monetary authorities have the power of raising or lowering the long-term rate of interest (p. 161), because (i) the short-term rate influences the long-term rate, (ii) they can, by creating superfluous cash, drive the commercial banks to buy securities, or (iii) the Government or the central bank can itself buy or sell securities.

This procedure presupposes that the changes in the short-term rate of interest or in the supply of cash do not take earlier effect on borrowing for the purchase of commodities. It is because the authors assume that this effect is unimportant that they are led to give rather undue prominence to the long-term rate of interest as an instrument of credit control. In doing so they might, no doubt, plead that they are merely accepting the predominant opinion of contemporary economists, and that that is what the writers of textbooks ought to do.

The "possible alternative open to a Government of stimulating revival by direct public expenditure" is discussed on pp. 164-8. This has the disadvantage, among others, of keeping the rate of interest up (p. 207). It would seem therefore to be just the contrary of the other method of stimulating business by lowering the long-term rate of interest. The implication, of course, is that the Government will raise its funds otherwise than out of income—that is from the proceeds of bank advances or idle balances. The authors quite rightly show that the resources of the investment market are

not formed exclusively from savings (pp. 152-4), but they do not examine in any systematic way in what circumstances the resources will exceed current savings or fall short of them. There is a rather surprising passage in which it is contended that "loans of the type contracted during the War period, when the additional claims to goods supplied to the Government involved no suspension of claims by anyone else who had to be remunerated for suspending them" might have been and might in the future be raised free of interest. The naïve assumption that all the War loans were inflationary leads on to the idea that Governments might be "placed in a position to make a more direct use of their own credit," and this might lead to "a state of affairs in which no intermediate asset existed between risky industrial securities and actual cash" (pp. 212-13). To say that "there might well be disadvantages" in such a condition of things is hardly an adequate comment. To offer a dose of John Law uncritically to "the general reader interested in the subject and to the elementary student of economics" is, to say the least of it, not helpful.

R. G. H.

5.—*Modern Banking*. By R. S. Sayers. Oxford University Press. 1938. $8\frac{3}{4}'' \times 5\frac{1}{2}''$. xi + 316 pp. 12s. 6d.

Mr. Sayers' book on Modern Banking combines an exposition of current theory and a description of the working of the modern money machine. It deals, after an introduction on money, with the commercial banks, the discount market, central banks with particular reference to the Bank of England, foreign exchanges, the Exchange Equalization Account, and he has chapters on Government financial policy and the banking system, and on the nationalization of banking.

The author states that the book is primarily addressed to the University student who wishes to include in his Honours course a study of banking, and for this purpose it is, no doubt, admirably suited. It would be a matter of surprise, however, if it did not enjoy a much wider circulation, for it should appeal to all students engaged in banking and financial business throughout the country, and also to the growing number of business men who are interested not only in the mechanism of the banking system through which they conduct their daily operations, but in the monetary theories propounded by the various schools of modern economists, and it is from the business man's point of view that the book is reviewed.

Business circles will be grateful to the author for explaining certain monetary theories in a language which they can understand, and which is free from terms with which they are unfamiliar.

Dealing with the Exchange Equalization Account, Mr. Sayers says, "The explicit official policy is to eliminate temporary ups and downs in the rates without interfering with the long-term trend of the market. . . . In this way foreign trade is left undisturbed by changes in the foreign exchange rates unless the balance of trade is in such serious disequilibrium that it is proper that foreign trade should be disturbed." With this sentence Mr. Sayers, no doubt, intends to cover disturbances due to a long-term trend, and also seasonal

disturbances such as occur annually in the dollar sterling exchange in the autumn. The law, of course, prescribes that the Account should be used to even out "undue" fluctuations, and the business man, who is probably often puzzled to know exactly what is meant by the word "undue," certainly would not take it to comprise ordinary seasonal fluctuations, or other fluctuations due to temporary trade conditions, but to the movement of funds from one country to another seeking a safer refuge, or for the purpose of snatching some speculative profit. Again, some business men agreeing with Mr. Sayers think it is becoming questionable whether the Account "is observing its criterion of 'not interfering with long-term trends.'"

Another theoretical point in which those engaged in business will be interested is the author's discussion concerning the effect on business transactions of alterations in the short-term rate of interest. It often appears to the business man that this effect is exaggerated by many economists. He in his calculations is much more concerned with present prices and his view regarding the future of prices than he is with changes in the short-term rate. He would agree that both prices and the short-term rate are influenced by changes in the ratio between the demand and supply of money and credit, but the rate which he has to pay for his money plays a smaller rôle in his calculations than changes in the general level of prices, and particularly changes in the prices of the special commodities in which he is dealing. This does not mean that a rise in the short-term rate of interest will not induce holders of stocks of commodities to liquidate them, because it frequently does. But the business man is aware that such liquidation more often results in the stocks passing from the hands of weaker holders into those of stronger holders, who take a long-term view, and can afford to wait, rather than forcing the stocks into actual consumption.

All business people are, of course, interested in the finding of ways and means to even out booms and slumps, and theoretically would agree with the view of Mr. Sayers, and many other economists, that a solution may be found in an adjustment of Government expenditure, so that it should be diminished in times of boom and augmented during the slump or the approach of the slump. The difficulty in their minds which still remains unsolved is how elected Members of Parliament or local authority councillors can be induced to have the courage to put schemes into work at a moment when their electors are telling their wives that business is so bad that they must lay up their motor-car and the wife must reduce her house-keeping expenses.

These are merely samples of some of the points of interest to the general public in a book which should be widely read. B. E.

6. --*The Finance of British Government 1920-1936*. By Ursula K. Hicks, M.A., B.Sc.(Econ). Oxford University Press. 1938. 9" x 6". xi. + 391 pp. 15s.

Until a decade or two ago the study of Public Finance was generally confined within narrow bounds. Some there were who

even believed that problems of expenditure were not their concern, and few realized the relevance of monetary policy. But the war and early post-war experiences changed all that. No one nowadays denies the all-pervasive influence of expenditure, or forgets that monetary policy may play an important if not a predominant part in public finance. But although on the importance of these matters there is now fairly general agreement, there is often violent disagreement on the precise part played, or to be played, by expenditure and monetary policies in practice—as, for example, in relation to the trade cycle. The final settlement of such controversial problems obviously demands a good deal of thought and work. An important preliminary step is to map out the ground to be covered, and to show the numerous factors involved and the points at which agreement turns abruptly into disagreement. This is one of the tasks successfully accomplished in the book under review.

To deal effectively with this and other financial problems which have arisen in recent years, Mrs. Hicks had an extremely wide field to cover, and accordingly decided to restrict her study to governmental bodies and financial transactions in the narrow sense. Compression was clearly inevitable in every direction, yet one may wish that a little more attention had been paid to expenditure on past and future wars, in view of its magnitude and all-round importance. In other directions the discussion is satisfyingly complete. Particular attention is paid to the expenditure on social services. Complaining of the absence of any satisfactory definition, Mrs. Hicks suggests they may be defined as “services provided or financed by public authorities mainly out of taxation, for the purpose of improving the welfare, health or education of the population.” Fortunately, she does not keep to this definition, which would apparently exclude such important services as unemployment insurance, but gives us an illuminating description of all the principal “social services” and a shrewd analysis of their economic effects.

Mrs. Hicks marshals her facts and figures in a way that carries conviction, but here and there may be found traces of underlying beliefs which all may not equally share: a belief that the marginal principle should and could easily be applied in theory and in practice; a belief in the infallibility of official estimates and in the overwhelming advantages of taxing commodities the demand for which is “inelastic”—a word which, incidentally, is not always used with the same connotation; and, seemingly, an abiding faith in the over-riding importance of economic factors in public finance. The last, at least, needs qualification. Economic factors may impose limits, but they are generally wide and long-period limits which do not necessarily become effective, and within which political factors may be all-decisive. Theory which fails fully to recognize this cannot fail to be a little unreal.

But Mrs. Hicks's approach is generally very realistic. She has given us a work at once detailed and penetrating, provocative yet sound, a mass of useful material for the student, and a comprehensive and comprehensible story for everyone interested in the multifarious activities of the modern state.

C. O. G.

7.--*Slump and Recovery, 1929-37, a Survey of World Economic Affairs.* By H. V. Hodson. Oxford University Press. 1938. 8½" × 5½". viii + 484 pp. 10s. 6d.

Britain in Recovery, Prepared by a Research Committee of the Economic Science and Statistics Section of the British Association. London: Pitman. 1938. 8½" × 5½". xvi + 474 pp. 15s.

The first of these books is issued under the auspices of the Royal Institute of International Affairs. It is founded on the chapters which the author contributed to seven successive volumes of the annual *Survey of International Affairs*, and thus forms a contemporary record and estimation of current economic happenings. "It is a history only of international affairs in the economic sphere, and it ventures on the story of developments within any international unit only when that story is necessary to an understanding of the international theme." The main elements in the period 1920-29 which formed the background of the subsequent history were the rise of economic nationalism, the increase of tariffs for industrial or strategic reasons, the new economy in Russia, the existence of political debts, the unequal distribution of gold, and the distortion of the currencies (especially in France and Germany). The inevitable disruption of the economic system was hastened by the Wall Street boom of 1929, by over-production of cereals, and by attempts to control prices. There followed the banking difficulties of 1930-31, the collapse of international lending, and troubles over reparations, which brought about the financial debacle of 1931 and the fall of the pound with world-wide repercussions. To protect their national economy during the slump of 1931-33 countries had recourse to tariffs and to systems of exchange control, which in turn "immensely aggravated the problem of international debts." In 1932 reparations were abolished and the British Government suspended payments of their debt to the United States until they should be paid by their debtors. Gradually a way out of the depression was sought by bilateral trade agreements, for attempts at international agreement on commercial and financial policies broke down. The American crisis of 1933-34 seriously worsened the situation, and the efforts to restrict production (of wheat, rubber, etc.) to amounts that could be sold at a profit were for a time dominant. The Ottawa Agreement worked slowly, but the depreciation of the pound favoured the growth of Empire trade. Japanese competition became serious, but one general characteristic of the period was "the divergence between internal and external trends," internal trade reviving, while external trade was depressed. There was competition in the devaluation of currencies and the "Gold Bloc" had to dissolve. Lastly, we have to note the agreement of Britain, France, and the United States to equalize the exchanges, and the armament boom of 1937-38. The boom in prices closed early in 1937, and there Mr. Hodson's story ends. He concludes that "the economic tale of 1930-37 is not entirely a gloomy one," but a return to peace and goodwill among the nations "is a necessary preliminary" to economic success.

The Research Committee of the British Association appointed in

1933 and reappointed in 1935 consisted of Professors J. H. Jones (chairman), G. C. Allen, and J. G. Smith, H. M. Hallsworth, R. F. Harrod, G. D. A. MacDougall (Asst. Secretary), and Dr. P. Ford (Secretary). Its report is divided into three parts—an Introduction by the chairman; a General Review (covering a general survey); employment and unemployment, the effects of recovery in the various regions, industrial relations, tariffs, preferences and other forms of protection, and a part dealing with separate industries—namely, agriculture (in three chapters, grain and other crops, milk, and livestock and meat trade, coal-mining, electricity, rail transport, motor industry, shipping, shipbuilding, iron and steel industry, engineering trades, building trades, cotton industry and wool textile industry. Of the eighteen authors of those separate studies, eight are Fellows of this Society; the chapter on the electrical industry is anonymous. This book is obviously the complement to the Chatham House publication, for it deals with domestic production as influenced by home demand and export trade. Professor Jones calls the period of eight years covered by the report a “trade cycle,” and adds, “We now appear to be advancing into another cyclical depression”; comment on this would revive a recent discussion before the Society. He also notes the growth of new industries and consequent changes in economic structure. “One of the outstanding features of the recovery period was the failure of British industry, in spite of rearmament, to absorb those thrown out of employment by changes in the industrial structure.” British recovery, however, Professor Jones concludes, was of a healthier form than that achieved in the United States by “pump-priming.”

These two admirable books form excellent guides through the economic jungle of the last eight years. H. W. M.

8.—*Expectations, Investment and Income*. By G. L. S. Shackle. London: Oxford University Press. 1938. 9" \times 5 $\frac{3}{4}$ ". 119 pp. 7s. 6d.

This book seeks to interpret and develop the ideas of Mr. Keynes, particularly those set out in his most recent *General Theory*. It is concerned almost entirely with the mechanism of a capitalist economy taken as a whole. Three of its chapters, forming the bulk of the book and entitled an outline theory of the business cycle, a theory of investment, and the nature of the business cycle, give a fair idea of its contents. In addition, there are short chapters on the rate of interest and inventions, and a somewhat complicated relation between the multiplier and income which the author would like to invoke as a partial explanation of the sudden collapse and relatively slow recovery noticeable in figures (and especially post-war figures) of trade activity.

This study is not a complete treatise on business cycles, but sets out rather to explain certain aspects of them. Throughout it is written with the greatest clarity and precision, though its slightly algebraic form may deter some readers who would find it useful. Especially valuable is the clear treatment of the dimensions of the concepts discussed: whether, for example, they are magnitudes

such as capital stock or time-rates or speeds such as income and investment.

As the title suggests, the author is particularly concerned with expectations. In earlier discussions involving to a greater or less degree the assumption of a stationary state, expectations were of little or no importance. Now, however, it is generally recognized that they are fundamental to a general analysis purporting to deal with the real world. It is to the credit of Mr. Keynes and those working on the same lines that they have directed attention to the influence which confidence and the state of the news have on practical affairs, and have prevented these factors from remaining solely the concern of business men.

As stated earlier, Mr. Shackle is more concerned with the mechanism of a capitalist economy with special reference to changes in the level of the national income than with ascribing these changes to any simple and invariable principle. At the same time he lays great stress on the operation of certain causes to the exclusion of others more generally recognized, and it may accordingly be of interest to examine briefly the nature of his main analysis.

The central argument on the nature of the business cycle runs somewhat as follows. An entrepreneur needs time to develop his plant once it is constructed or extended in a major way, and so for each firm a period of high investment is followed by a period of low investment. Since an initial stimulus will increase incomes, partly through itself and partly through the multiplier effect, it will also increase the profitability of durable equipment, and this movement will grow on itself. A time will come when most entrepreneurs have recently made a large extension, and accordingly a period of low investment will follow as a matter of arithmetic.

The crux of this argument from the practical point of view seems to lie in the question whether, when things are going well, a business man *will* take the view that he should consolidate his position rather than extend his operations. It may be that this is an assumption grounded in fact, but the way in which capacity seems to grow in some industries not only at the height of the boom, but also after the national income has begun to fall, suggests that perhaps business men do not always, or even generally, act as the author assumes or, alternatively, that the supply of entrepreneurial ability is so elastic as to invalidate the application of the theory to the world we live in.

As a second string to his bow, Mr. Shackle advances a theory concerning expectations regarding the influence of the multiplier. He points out that the secondary effects of a given stimulus will probably at first be *unexpected*, but that as time goes on they will come to be anticipated. As a result of this, investment will be pushed to a high level consonant with the change in expectations. The anticipated increase will occur, but, since it was expected, will not by itself give a further stimulus to investment, and, apart from other influences, the boom will be at an end. This movement will not take place at a point of time, as the author seems to imply, since the abnormal increase in investment, once the multiplier effect

comes to be anticipated, will lead to a more than expected increase in incomes, and so in prospects for durable equipment, but over a period a mechanism such as this may well play a part.

In view of the fact that so much space is devoted to these explanations, it seems rather odd that no mention is made of what might seem a more obvious effect—namely, the influence of (net) investment, not only in stimulating incomes, and therefore the earning prospects of capital goods, but also in adding to their supply so that a point may come when the marginal efficiency of capital begins to fall. This proposition has already been discussed by Mr. Keynes and Mr. Kalecki, but seems to deserve some attention in any discussion of booms and slumps.

The argument is conducted throughout on a highly theoretical plane, and at no point is there any direct appeal to the facts of the real world. On orders of magnitude and importance there is little that the pure theorist can be expected to say, and at some points (cf. Chapter VII) the more empirically minded may feel inclined to criticize Mr. Shackle for venturing far down the path of theoretical elaboration in circumstances where the facts seem to call for no such complexity. It is on the question of orders of magnitude and importance that the economist must look to the statistician, who in his turn will be repaid for the study of a book such as this.

R. W. S.

9.—*The Lessons of Monetary Experience*, Essays in Honor of Irving Fisher. London: Allen & Unwin. 1937. 8¼" × 5½". xiii + 450 pp. 12s. 6d.

A word of notice is due to this book, which consists of twenty-two essays by authors from fourteen different countries, written for presentation to our Fellow, Professor Irving Fisher, on the occasion of his seventieth birthday. Among the authors are R. G. Hawtrey, J. M. Keynes, A. Loveday, G. F. Shirras, Sir Henry Strakosch, and Professor Verriijn Stuart, Fellows of this Society, and the book is edited by Professor A. D. Gayer. Mr. Hawtrey writes on "The Credit Deadlock," Mr. Keynes on "The Theory of the Rate of Interest," Mr. Loveday on "Collective Behaviour and Monetary Policy," Professor Shirras on "The Absorption of Gold," Sir Henry Strakosch on "The Monetary Tangle of the Post-War Period," and Professor Verriijn Stuart on "The Netherlands During the Depression." Among other essays may be noted, Mr. Eccles (Chairman of the Board of Governors, Federal Reserve System) on "Controlling Booms and Depressions," Professor Einaudi on "The Mediæval Practice of Managed Currency," Professor Lindahl on "International Economic Reconstruction Realised Through Rational Management of Four Currencies," and Professor Ohlin on "Employment Stabilisation and Price Stabilisation." Few aspects of monetary policy are neglected by the writers, and there is much in these pages to stimulate thought. Mr. Eccles, it may be noted, while recognizing the importance of monetary policy, holds that it must be supplemented by a fiscal policy aiming at regulating business activity, and by a foreign exchange policy "not tied to a rigidly automatic gold

standard." "I do not believe," he says, "that the budget should be balanced and the debt retired at the expense of those who are jobless and still in want," and again, "It is important that the share of the national income going to labour should be increased." Such statements from a man in his position deserve attention. Space forbids analysis of the other essays.

A brief biographical sketch of Irving Fisher is appended to the book, together with a selected bibliography of his writings.

H. W. M.

10.—*Location Theory and the Shoe and Leather Industries*. By Edgar M. Hoover, Jr. Harvard University Press. 1937. (London: Humphrey Milford.) 9" × 6". xviii + 324 pp. 15s.

Published in the series "Harvard Economic Studies," this book does not claim to provide an exhaustive treatment of the theory of location, nor to be a complete history of the American shoe and leather industries. The author's aim has been "to present enough of the outlines of the theory to acquaint the reader with progress in this still somewhat esoteric field, and to place the historical matter relating to the shoe and leather industries in its proper setting."

The first part of the book is devoted to "The Theory of Location." The author first deals with the distribution of extractive and manufacturing industries under certain simplified conditions, the locational factors being: (i) the distribution of natural resources involving local differentials in costs of extraction, and (ii) transportation costs. Other factors are then brought into account, beginning with differences in labour costs, passing on to production-cost differentials in general, and finally the variation of manufacturing costs with the degree of local concentration of production.

In Part II the author traces the history of the leather industry in the United States from the point of view of location. Works of reference relating to the leather trade are remarkably few in number, and cover only certain features of what is really a very complex industry. It is therefore not surprising that a few discrepancies have crept into this particular section of the work. For example, on p. 134 Mr. Hoover refers to the increase in the consumption of calf, goat, and sheepskins relative to cattle-hides in the United States. He says that this is important locationally because "the weight loss is much greater on the smaller and hairier skins. More skin must be used for the same amount of leather. In the case of goatskins, this at least doubles the locational importance of nearness to skin supply." It is true that more skin must be used to produce the same weight of, say, goatskin leather as cattle-hide leather, but weight is not the important factor, but area measurement. If a shoe manufacturer decides to make shoes with glacé kid uppers, whereas formerly he used hide upper leather, he replaces, say, $2\frac{1}{2}$ square feet of hide leather by $2\frac{1}{2}$ square feet of glacé kid, but about $\frac{1}{2}$ lb. of hide leather is replaced by little more than 3 oz. of kid leather.

Again, on p. 137, referring to the replacement of tanning barks

by extract, the author says, "Since the weight of tanning material transported per unit weight of product was reduced by about 90 per cent. by the use of extracts, the locational importance of nearness to bark supply relative to nearness to market was correspondingly lessened." The figure of 90 per cent. actually implies that the tanning extracts have 100 per cent. tannin content, which is very far from the truth.

In support of his conclusions regarding the optimum size of the individual establishment in the leather industry, Mr. Hoover quotes from Census data (Table 9) the average number of wage-earners and average horse power per establishment in (i) the leather industry, and (ii) all industries, at ten-yearly intervals for the period 1889-1929. The fact that the averages for the leather industry are generally two or three times the corresponding averages for all industries has very little meaning. The only conclusion which the reader will draw from the figures is that the average establishment in the leather industry is certainly not large (the average number of wage earners per establishment in 1929 was 106), whilst the census undoubtedly covers many industries containing a large number of small concerns (the corresponding average for all industries being 42).

In contrast to the leather industry, the boot and shoe industry possesses a fairly extensive bibliography, of which Mr. Hoover seems to have made a close and exhaustive study. A detailed account of the historical development of the shoe industry from the locational aspect is given in Part III. The author lays due emphasis on the comparative ease of setting up a factory for shoe production, owing primarily to the practice of machinery leases, further facilitated by the promoting efforts of small communities, real estate agencies, power companies, etc. This ease has certainly not been an unmixed blessing either to the industry or the community.

Part IV summarizes first Parts II and III, and finally the theory of location in general, whilst an extensive bibliography is provided.

G. R. W.

11.—*Trade Associations in Law and Business.* By Benjamin S. Kirsh. New York: Central Book Company. 1938. 9" x 6". 399 pp. \$5.

Students of industrial combination should not confine themselves to the investigation of cartels and trusts, but should also scrutinize carefully those trade associations which go beyond their original design of "co-operation" in technical matters, and enter the field of monopolist trade policy. The "trade practices" of such associations are sometimes more efficient than the limitation of production or the fixing of prices by quasi-monopolist syndicates. In view of the supposed hostility of the common law to monopolies, it is important to remember that in 1937 the House of Lords, in *Thorne v. Motor Trade Association*, decided that a rule of a "certified" trade association requiring members or other persons to sell their goods at fixed prices was legal. The names of members or other persons who broke this rule were placed upon a "stop list," and

this, said our highest court of law, was neither illegal nor "*ultra vires*," provided that the rule was operated with the honest intention of carrying out the trade policy of the associations. Since there is no book giving a full account of British trade associations and their rules, Mr. Kirsh's book (written in collaboration with Professor H. R. Shapiro) on those existing in the United States is of particular interest. It is written in connection with the National Economic Committee, which is to enquire into the entire question of the concentration of economic control and monopolistic trade practices in industry. According to the latest survey, trade associations in the United States now total 8,200, of which 2,900 relate to manufacturers, 2,800 to retailers, 1,900 to business service firms and 600 to wholesalers. Mr. Kirsh's study on a similar subject in 1928 earned him a reputation, and his new book is full of detail, well written, and suggestive. The chapter on "Boycotts and Defensive Combinations" appears particularly illuminating, and might well serve as a model for similar enquiries in other countries. Another chapter deserving special attention is that on "Foreign Trade Functions of Trade Associations," which is of importance not only in reference to American anti-trust policy, but may also be studied in connection with the recent Anglo-American trade agreement. While the legal and political sides of trade associations are treated with great knowledge, the economist misses an analysis of the economic conditions which contribute to the formation of such associations and secure their success. Such analysis is not merely of formal interest: it should enable us to study how far the power of such bodies should and could be limited by legislation. Mr. Kirsh would do a service if he added such an investigation to his present work.

H. L.

12.-*De la nature de la richesse et de l'origine de la valeur.* By Auguste Walras. Paris: Félix Alcan. 1938. 9" × 5½". xv + 343 pp. 50 fcs.

This is an admirable reprint of an old and scarce work by an author who has not always received the attention he deserves. In the most recently published history of economic thought, Auguste Walras is briefly mentioned on two occasions, while in earlier historical sketches he gets even scantier notice or none at all. Yet the work now reprinted well repays reading, not only in view of the increasing stress nowadays laid on the conception of rarity, which is analysed by Walras in great detail, but also because, as Professor Pirou points out in the preface, a study of this volume is necessary if one is fully to understand the work of Walras's more famous son and the extent of the father's influence thereon. It certainly throws light on some of the minor problems of the *Elements*, such as, for example, why Léon Walras adopted the alien conception of *utilité d'extension*, and suggests that an intellectual inheritance is not necessarily an unqualified asset nor filial piety an unmixed virtue.

The reprint contains a valuable and detailed introduction on the life and works of Auguste Walras by Professor Leduc, who also

contributes a series of helpful notes. The book concludes with two supplementary texts.

As the work contains so many lengthy passages attacking various theories of J. B. Say, one can only envy the editor's good fortune in being able to secure Say's own annotated copy. The interpolation of the latter's comments, unedited, at critical points of the Walrasian argument adds a piquant note. C. O. G.

13.—*The Worker's Standard of Living*. A Report issued by the International Labour Office. London: P. S. King. 1938. 9½" × 6¼". 101 pp. 2s.

This Report is the outcome of a resolution adopted by the Assembly of the League of Nations in October 1937, when measures for raising the standard of living were under consideration. The purpose of this study, which is to outline the problem and to indicate lines for further work, has been very neatly achieved in less than a hundred pages.

The first of the four chapters is concerned with the meaning of the phrase "standard of living" and with some of the factors that determine it. It is appreciated that any standard contains a subjective element in the attitude of the individual towards economic goods and life in general—but this factor is considered to be outside the scope of the Report. The standard of living is defined in objective terms as consisting of: (a) the level of consumption (of goods and services), (b) social and free services, particularly those relating to health, education and recreation, and (c) working conditions which affect health as well as the size and regularity of the income. From the discussion, it is concluded that raising the standard of living is a problem, first, of doing away with poverty; secondly, of improving the content of living with regard to consumption and free services, and thirdly, of working conditions.

Chapter II consists of the description and evaluation of the worker's standard of living. The general impression given in this section is that, with regard to income at least, the necessary data either do not exist or are available only in the form of estimates, largely unofficial, based on relatively small samples. Rather more information is available for details of expenditure on the main items of the cost of living. It is clear from the section dealing with clothing that it is impossible to exclude the "subjective element" which, on p. 20, is considered to be outside the scope of the Report.

In order to illustrate the points made in Chapter II, a brief description of the workers' living standards in the United States, Poland, India, and Japan is given in Chapter III. For each of these countries, income, expenditure, food consumption, housing, health, and literacy are separately considered, and the Report rightly emphasizes that in many respects only very slender data exist. The survey made in Chapter III shows "that the level of family income and the size of family are the chief determinants of the worker's standard of living."

The main value of this Report lies in the argument and content, rather than in the conclusions. Not the least important of its

merits is that it draws attention to the paucity of real evidence on the subject. Although the standard of living is the very root of well-being, we have as yet hardly begun to measure it. R. F. G.

14.—*Poverty and Population*. By Richard M. Titmuss, foreword by Lord Horder. London: Macmillan. 1938. 8" × 5½". xxviii + 320 pp. 10s. 6d. net.

This is an interesting book, and merits the careful attention of everyone concerned with the present and future well-being of the population. The sub-title, "A Factual Study of Contemporary Social Waste," accurately describes the work. The author's thesis is that the inevitable decline in the population of this country makes it all the more vital that immediate attention should be given to the present condition of the people. There is no doubt that we must look to the poorer areas of to-day for the people of to-morrow, and the author is therefore particularly concerned with the social waste that is occurring in the poorer areas at the present time. An attempt is accordingly made to analyse the connection between "premature death and its close relatives, ill-health, malnutrition, and 'life without interest,' and factors such as unemployment, poor relief and unsatisfactory environment . . .". Two important considerations underlie this study: (a) that the much poorer areas contain by far a higher proportion of our children than the better-off areas, and (b) that the higher fertility in the poorer areas has prevented an earlier, and probably calamitous, fall in the size of the population.

The author contends that little purpose is served by considering the improvement in mortality statistics for the country as a whole over a period of years, a practice that may give rise to dangerous complacency and satisfaction. It is much more valuable and more to the point to compare the present conditions in those areas which have the best and the worst records in this respect. The relevant statistics are therefore given for the Northern counties and Wales, in contrast to those for the South Eastern counties, which, representing the area with the best level of health, are taken as the "standard." Infantile mortality in the North and in Wales is shown to be 50 per cent. greater than in the Home Counties; for certain particular causes of death, the disparity is very much larger. Similarly for deaths at ages 5-15, and for adult and maternal mortality, the contrast between the "standard" and the other two areas forcibly illustrates the social waste that is occurring at the present time. Mortality from cancer, tuberculosis, and the respiratory diseases is analysed in detail, to indicate how very inferior is the record of the North and of Wales.

Statistics of unemployment, poor relief, prolonged sickness, housing, overcrowding and purchasing power are given in the Chapter entitled "The Dynamics of Premature Death." Each of these sections leads to the same conclusion—that the evidence of, and those factors responsible for, an impoverished standard of life are much more intense in the North and Wales (where the parents of the future are to be found) than in the Home Counties. It is

most clearly demonstrated that the lack of opportunity to enjoy even the lesser amenities of life is closely associated with mortality and morbidity. In the final pages, the author points out that every year in this country, 50,000 persons die before their time from avoidable causes, and that if the general conditions of life that are characteristic of the Home Counties could be made available for the people in the North and in Wales, the efficiency of life in the less fortunate areas would undergo a revolutionary improvement.

Mr. Titnuss has made a valuable contribution to the subject of poverty and life. By a masterly arrangement of existing evidence he has worked out a striking argument. R. F. G

15.—*Wheat Commission. Report upon the administration of the Wheat Act, 1932, from July 1, 1932 to July 31, 1937.* London: H.M. Stationery Office. 1938. 9½" × 6". 253 pp. 1s.

The Wheat Act provided financial assistance and marketing security for wheat-growers in the United Kingdom by an entirely new plan, and this Report reviews the purposes and practical effects of the Act and the problems with which the Commission have had to deal. It is of interest as the scheme on which the Act was based was quite a novel one in regard to which no previous experience was available.

Among the objects which Parliament had in view when the Act was passed was an extension of the area under wheat to the pre-war average, and statistics given in the Report show that this has just about been accomplished. In 1931, the area had fallen to 1,250,000 acres, but under the stimulus of the scheme, it was raised in the five years 1933-37 to an average of 1,827,000 acres, which was very close to the average of 1,861,000 acres in the five years 1910-14. Part of the increase was obtained by the diversion to wheat of land previously under oats or barley, but the general effect was to check the reduction of the area under the plough. This will probably be extended by the assistance now given to growers of oats and barley and by the enlargement of the scope of the Wheat Act since 1937.

Other tables show that the method adopted has not in any way operated to restrict consumption, the total retained supply having been consistently larger than in the years preceding the passing of the Act. As regards the price of flour, the effect of the quota payment was to raise the price of bread slightly, but the main increase between 1931-32 and 1936-37 was due to the rise in wheat prices from the abnormally low levels of 1931-34. In fact, when the quota payment was at its highest level in 1933-34 and 1934-35, the price of bread was 1½d. to 1¾d. per quartern cheaper than in 1936-37, when owing to high wheat prices the quota payment was for a period entirely suspended. R. J. T.

16.—*An Economic Survey of Buckinghamshire. Part I. Farms and Estates.* University of Reading, Agricultural Economics Department. 1938. Pp. 45.

This Report contains the results of the first of a series of economic surveys of farming intended to cover each of the eight

counties associated with Reading University. It consists of a statistical analysis of the number of agricultural holdings in Bucks. classified in various ways according to their economic significance. A gap in existing information of this type is that there is no means of distinguishing the extent to which land is occupied by professional farmers and land used agriculturally but not providing whole-time occupation. The importance of the distinction is shown in this survey by the fact that only 56 per cent. of the holdings were found to be occupied as full-time farms, though in addition 15½ per cent. were spare-time or part-time holdings run for profit, but occupied by people with some other employment. These three classes accounted for over 89 per cent. of the area. The remaining land included home and hobby farms not run purely for profit, plots of land let for grazing, and other miscellaneous categories.

Other points investigated in the survey were the type of tenure and the character of the agricultural estates in the county. Holdings occupied by the owners accounted for about 44 per cent. of the number and 40 per cent. of the area, the remainder being rented. Nearly one-half of the holdings under 50 acres were owner-occupied.

A comparison of the figures obtained by the survey and those collected annually by the Ministry of Agriculture revealed some appreciable discrepancies in the official returns, partly owing to holdings or plots of ground which were in fact farmed with other holdings being returned separately, and partly owing to some actual omissions. The difficulty of ensuring that all holdings are enumerated in the annual statistics has always been recognized. The returns are based on lists of names compiled by the local rating authorities, and as these lists are not always up to date, there is a time-lag in regard to changes from year to year. Discrepancies also arise, especially in the case of small areas, from the persons making the returns not adhering strictly to the instructions. On balance, however, the difference in the aggregate was not very great, the survey accounting for 4,254 holdings with a total area of 368,731 acres, against the official estimate of 4,378 holdings with a total area of 373,654 acres. The effect, however, of returning separately holdings which are in fact farmed or occupied jointly with other holdings was to show appreciable differences between the survey and the official returns as regards sizes of holdings. R. J. T.

17.—Other New Publications.

Jenks (Leland Hamilton). The Migration of British Capital to 1875. London: Cape, 1938. 8" × 5¼". 442 pp. 15s.

[Except for the omission of the preface, this is a facsimile of the first edition of the book (published in 1927 and reviewed in the *Journal* for 1938), now issued as one of the Bedford Series of Economic Handbooks. The work consists of a detailed historical account of British investment abroad, preceded by a chapter describing eighteenth-century finance and followed by very full and bibliographical notes and by appendices giving a list of Thomas Brassey's foreign contracts (1834-70), the values of our principal exports of capital goods (1846-76),

Government issues in London (1860-66), foreign security issues made in London, Securities of private companies operating abroad and issued in London (1860-76).]

King (Constance M. and Harold). "The Two Nations," the Life and Work of Liverpool University Settlement and its Associated Institutions, 1906-37. Liverpool University Press. London: Hodder and Stoughton, 1938. 8½" × 5½". 238 pp. Price 7s. 6d. net.

[Although this interesting little book is not a statistical work, it relates to conditions which for their amelioration require statistical investigation; moreover the Settlement has itself undertaken enquiries of a more or less statistical nature, described in Chapters VI and VII, the results of which have been utilized in framing legislation. The other chapters give accounts of the foundation of the Settlement and the associated institutions, and of their several activities—the Clubs, the David Lewis Theatre and Hotel. Appendices give a chronological survey, lists of personnel, etc. Mr. J. J. Mallon contributes a foreword.]

Layton (Sir Walter T.) and Crowther (Geoffrey). An Introduction to the Study of Prices. 3rd ed. London: Macmillan, 1938. 7¼" × 4¾". xiv + 288 pp. 8s. 6d.

[A review of the second edition of this book appeared in the *Journal*, Vol. 98, p. 744. In the present issue the statistical material in the appendices has been brought up to the end of 1937, and a brief account of the years 1934-37, on similar lines to the other historical chapters, has been added to Chapter XI. Otherwise no changes have been made.]

Unemployment Assistance in Liverpool: Report on Co-operation between the Unemployment Assistance Board, the Local Authority, and Voluntary Associations in Liverpool. Liverpool University Press. London: Hodder and Stoughton, 1938. 9½" × 6". 64 pp. 2s. 6d.

[It is regretted that, through an oversight, earlier notice was not given to this very interesting report on the results of the examination, made by the School of Social Science of Liverpool University, of a scheme of co-operation between the Unemployment Assistance Board and other public bodies and voluntary agencies. The University undertook the work at the request of the Board, who invited criticism and suggestions for rendering the assistance more effective. The report is a valuable document, throwing light on a number of problems, and the findings of the Committee should afford useful guidance in other municipalities where a number of bodies, engaged in giving assistance under different regulations and with different ends in view, tend to bring about wasteful overlapping and leave regrettable gaps. It was shown that in Liverpool, on the one hand, "one in five of the persons in receipt of unemployment assistance whose records were examined were also in contact with one or more other bodies" and, on the other, that one prevalent cause of trouble was "the failure of the statutory local bodies to make use of their permissive powers." Enquiries in detail and by sample were undertaken, with respect to the domestic circumstances, age distribution, income, etc., of the applicants in order to ascertain how far their needs went beyond the assistance which should properly be provided by the Board, and the report thus incidentally furnishes some valuable statistical information relating to the unemployed in Liverpool.]

STATISTICAL NOTES

(1) BRITISH OFFICIAL STATISTICS

On page 115 we give our usual table summarizing the *oversea trade* of the United Kingdom for the years 1937 and 1938. Following the substantial increase in imports, exports and re-exports in 1937 there was an all-round decline last year, but the figures for 1938 were higher than those for 1936 by £73 million for imports, £30 million for exports of United Kingdom goods and £1 million for re-exports. In comparison with 1937 declines of £107.4 million were recorded for imports, £50.5 million for exports and £13.5 million for re-exports. As a result, the excess of imports over exports, which reached a peak in 1937, was reduced by £43 million to £388 million. An increase in the adverse balance was recorded in the first quarter, but this has been reduced in successive quarters as shown in the following table :—

				Increase or decrease in 1938 compared with 1937			
				Imports	Exports	Re-exports	Excess of imports over exports
				£ mill.	£ mill.	£ mill.	£ mill.
First quarter	...	...	...	+15.3	— 0.2	—3.0	—18.5
Second quarter	...	...	...	—29.7	—17.8	—4.7	+ 7.2
Third quarter	...	...	...	—37.0	—21.0	—5.3	+10.7
Fourth quarter	...	...	...	—56.0	—11.5	—0.5	+44.0

The improvement in the adverse balance is seen to have resulted from a much larger decrease in the value of imports than of exports, mainly in the last quarter. Prices of imports fell quarter by quarter after the third quarter of 1937, and in the last quarter of 1938 were about 10 per cent. lower than a year earlier. Prices of exports of United Kingdom goods, always more stable than prices of imports, rose less in 1937 and fell less in 1938, and the slight fall—2 per cent. for the last quarter—did not commence till the second quarter of the year. In volume, retained imports were $4\frac{1}{2}$ per cent. smaller last year than in 1937, while exports of United Kingdom goods declined by 11 per cent. In value, imports fell by 10 per cent. to £920.4 million and re-exports by 18 per cent. to £61.6 million, making the fall in retained imports £93.9 million (10 per cent.); exports of United Kingdom goods declined by the same proportion to £470.9 million.

The rapid increase in the value of retained imports of food, drink and tobacco came to an end in 1938, there being last year a rise of only £1.2 million to £419.1 million; in the last quarter there was a decline in each month, aggregating £15.2 million. Prices tended to fall throughout the year, and for the whole year averaged about 3 per cent. lower than in 1937, as estimated in the Board of Trade Journal for January 26th. In volume there was an estimated rise of 3 per cent., following a rise of 1 per cent. in the previous year. The principal decline in prices was in respect of cereals, the average value of the wheat imported falling by 26 per cent. Retained imports of wheat rose from the abnormally low figure of 95.1 million cwts. to 101.4 million cwts., the increase including the wheat purchased by the Government as a war reserve. There was also an increase (9 per cent.) for imports of barley to the highest figure (19.9 million cwts.) recorded since 1924, but a reduction of 10 per cent. for flour and a much larger reduction (20 per cent.) for maize. Imports of beef and bacon showed little change; for mutton and lamb an increase of 2 per cent. was recorded. Average values of all three descriptions of meat were the highest for at least six years. Among dairy produce the only appreciable change was a rise of 12 per cent. in imports of eggs to the highest figure (277 million dozen) yet recorded. The rise in imports of apples and fall in imports of oranges were to more normal figures than those recorded for 1937. Retained imports of tea rose by 10 per cent., but consumption was unchanged. The quantity of unrefined sugar imported, including Government purchases, constituted a record, as did that entered for home consumption. Retained imports of tobacco were the highest apart from 1919, and the quantity entered for home consumption was 4 per cent. higher than the previous year's record.

Retained imports of raw materials in 1938, valued at £217.3 million, were £61.0 million less than in 1937, there being a substantial decline in each quarter after the first. Average values fell by 12 per cent., and volume by 12 per cent. from the record figure of the previous year. Imports of raw materials reached a peak in 1937, and there were record importations of a number of commodities. In most cases declines were recorded in 1938, but the 1937 record figures for silk, asbestos, groundnuts and whale oil were surpassed last year, imports of whale oil, which include Government purchases, rising by 49 per cent. Increases of the same order were recorded for retained imports of rubber, copra and unrefined coconut oil. Cotton, hard and soft wood, iron ore and hides were all imported in much less quantity than in 1937.

Changes in respect of raw materials were matched by those for articles wholly or mainly manufactured, retained imports of which fell by £35.0 million to £215.5 million, about half the decline being due to lower prices. Imports of iron and steel returned to more normal figures—1,341,000 tons as compared with 2,033,000 tons; there were also considerable reductions in respect of motor-cars and machinery. Among non-ferrous metals declines were recorded for copper, tin, zinc and nickel, but retained imports of lead reached record dimensions for the third year in succession. Retained imports of petroleum—motor spirit in particular—were also the highest yet recorded, partly, no doubt, as a result of the creation of a war reserve.

Though the value of coal exported last year differed but little from that in 1937, the quantity fell by 11 per cent. to 35,861,000 tons. The decline applied to nearly all markets, but three-fifths of the total decrease of 4,477,000 tons was due to smaller exports to France. The proportion of the total value of British exports represented by coal, after falling from 1931 to 1936, has risen in the last two years, the proportion last year being 7.9 per cent., compared with 6.6 per cent. in 1936. Exports of iron and steel fell last year by 25 per cent. to 1,918,000 tons, the lowest figure since 1933; the decline was very general, though a few markets, including Iran, Australia and New Zealand, took increased quantities. The Board of Trade have calculated that, adding together the value of the exports of iron and steel and manufactures thereof, iron ore and scrap, cutlery, hardware and tools, machinery and vehicles (except rubber tyres), the contribution to the total value of British exports was 24.4 per cent. in 1929, 25.4 per cent. in 1936, 27.2 per cent. in 1937 and 31.3 per cent. last year. The quantity of machinery exported last year was the highest since 1930. The number of motor-cars and chassis exported, after attaining record dimensions for five years in succession, fell last year from 105,200 to 89,700. There was also a marked fall in exports of pedal cycles after three successive records. Exports of aircraft created a record for the fourth year in succession, rising from £3,674,000 to £5,409,000. The value of ships and boats exported (£8,491,000) was more than double that in 1937, being the highest since 1931; there was also an increase in exports of locomotives and railway wagons and trucks. A decline was recorded for cutlery and hardware from the high figure of the previous year.

As regards textiles, it is stated in the *Board of Trade Journal* that in 1929 textile exports formed 31.3 per cent. of the total value

of British exports, but this proportion has been lower in recent years, and last year amounted to only 21.3 per cent. compared with 26.5 per cent. in 1937 and 27.6 per cent. in 1936. This is the smallest proportion yet recorded. While there was a decline in all the main categories, cotton goods accounted for the bulk of the fall, as they formed 18.7 per cent. of the total British exports in 1929, but only 14.2, 13.3 and 10.6 per cent. in 1936, 1937 and 1938, respectively. For wool and manufactures thereof the proportions were 8.6 per cent. in 1929 and 9.1, 8.5 and 7.0 per cent. in the last three years. Exports of cotton yarns were, except for 1918, the lowest recorded since 1865, and exports of cotton piece-goods were the lowest since 1850, the decline last year being from 1,921 to 1,386 million square yards. All the principal markets shared in this decline and exports to India (293 million square yards) were the smallest for many years. There were no increases among other principal classes of textile exports. The quantity of woollen and worsted yarns exported was the lowest since 1919, and of linen piece-goods the lowest since 1921. The decline for woollen and worsted tissues amounted to 26 per cent.

Among other goods the reduction in exports was very widespread. There were, however, small increases for cement, brass and manufactures, unwrought nickel, electrical goods and ammonium sulphate. Decreases of 20 per cent. or more were recorded for leather, sodium compounds and paper, cardboard, etc.

Movements of bullion and specie in 1938 were much affected by the international situation last September and the continued transference of funds to the United States caused by the weakness of sterling. The net outward movement began in August and up to the end of the year amounted to £158 million, of which £103 million was in September and October. In the aggregate, exports exceeded imports last year by £74 million, following a series of six years in which there had been a net excess of imports amounting in all to £732 million. The outward balance last year included £11 million in respect of silver; this was the result of an excess import of £10 million the previous year, large amounts of silver being imported in each year from Hong Kong and exported subsequently to the United States.

Part I of the Final Report on the *Fifth Census of Production and the Import Duties Act Inquiry, 1935* (1938 : 8vo. xviii + 512 pp., 7s. 6d.), has lately been published, covering the Textile Trades,

Movements and Classes	Twelve Months ended December 1937	Twelve Months ended December 1938.	Increase (+) or Decrease (-)			
Imports, c.i.f.—	£'000	£'000	£'000			
Food, drink and tobacco	431,100	431,378	(+) 278			
Raw materials and articles mainly un- manufactured	315,236	247,603	(-) 67,633			
Articles wholly or mainly manufac- tured	274,901	233,842	(-) 41,059			
Other articles	6,587	7,615	(+) 1,028			
Total Imports ...	1,027,824	920,438	(-) 107,386			
Exports, f.o.b.—						
<i>United Kingdom Produce and Manufactures—</i>						
Food, drink and tobacco	38,775	35,911	(-) 2,864			
Raw materials and articles mainly un- manufactured	64,629	56,923	(-) 7,706			
Articles wholly or mainly manufac- tured	404,656	365,372	(-) 39,284			
Other articles	13,332	12,677	(-) 655			
<i>Imported Merchandise—</i>						
Food, drink and tobacco	13,187	12,307	(-) 880			
Raw materials and articles mainly un- manufactured	36,875	30,256	(-) 6,619			
Articles wholly or mainly manufac- tured	24,443	18,345	(-) 6,098			
Other articles	628	700	(+) 72			
Total Exports ...	596,525	532,491	(-) 64,034			
Bullion and Specie—						
Imports	315,342	257,729	(-) 57,613			
Exports	225,376	331,624	(+) 106,248			
Movements of Shipping in the Foreign Trade—	Number of Vessels	Thousand Tons Net	Number of Vessels	Thousand Tons Net	Number of Vessels	Thousand Tons Net
<i>Entered with cargoes—</i>						
British	24,926	39,290	24,215	38,908	(-) 711	(-) 382
Foreign	28,033	31,130	26,004	29,464	(-) 2,029	(-) 1,666
Total entered ...	52,959	70,420	50,219	68,372	(-) 2,740	(-) 2,048
<i>Cleared with cargoes—</i>						
British	30,993	35,983	29,184	34,512	(-) 1,809	(-) 1,471
Foreign	23,778	25,407	21,520	24,367	(-) 2,258	(-) 1,040
Total cleared ...	54,771	61,390	50,704	58,879	(-) 4,067	(-) 2,511

Leather Trades, and Clothing Trades. Taking the Textile Trades as a whole, and comparing 1924 with 1935, the number of establishments has declined from 7,927 in the former year to 7,038 in the latter, the gross output from nearly £763,000,000 to a little below £446,000,000, the number of persons employed from 1,262,000 to 1,055,000, and the net output per head from £176 to £149. The fall in net output per head was from £186 to £111 in cotton spinning, from £133 to £123 in cotton weaving, from £194 to £180 in wool textiles, from £254 to £172 in silk and artificial silk, from £122 to £102 in linen, from £159 to 150 in hosiery, and from £248 to £183 in textile finishing. Against the reduction in persons employed may be set an increase in coal used from 7,129,000 tons in 1930 to 7,580,000 tons in 1935, and in electricity from 1,051 million B.T. units to 1,545 million. Firms employing under 100 persons in 1935 accounted for 34.0 per cent. of the establishments, for 16.6 per cent. of the employees, and 18.5 per cent. of the net output; firms employing from 100 to 499 employees had 58.8 per cent. of the establishments, 55.2 per cent. of the employees, and 52.5 per cent. of the net output; and firms with 500 employees or over included 7.2 per cent. of the establishments, 28.2 per cent. of the workpeople, and 29.0 per cent. of the net output. The volume of production was 10 per cent. greater in 1924 than in 1935 in cotton yarn, 46 per cent. greater in cotton manufactures, 50 per cent. in textile packing, and there were slight excesses in linen, jute, textile finishing, lace, and flock and rags; production was less in 1924 than in 1935 by 8 per cent. in wool textiles, 80 per cent. in silk and artificial silk, 30 per cent. in hosiery, 12 per cent. in ropes, and by varying percentages in other goods. Wages paid by firms making returns were 50.8 per cent. of the net output in 1924, 58.2 per cent. in 1930, and 56 per cent. in 1935.

The Leather Trades between 1924 and 1935 showed a decrease in the number of establishments from 875 to 841, but the numbers employed rose from 48,400 to 50,500, the increase being mainly in the Leather Goods trade. Net output per head fell from £278 to £249 in tanning and dressing, from £149 to £146 in leather goods, and from £240 to £211 in all leather trades. The consumption of coal rose from 228,000 tons in 1930 to nearly 245,000 tons in 1935, and that of electricity from 41 to 51 million B.T. units. Firms employing under 100 persons in 1935 had 84.0 per cent. of the establishments, 49.6 per cent. of the workers, and 46.7 per cent. of the net output; those with 100 to 499 had 15.6 per cent. of the establishments, 46.5 and 51.0 per cent.; and three firms with 500 or more workers 3.9 and 2.3 per cent. Volume of production in

1924 was less than in 1935 by 13 per cent. in tanning and dressing and by 9 per cent. in leather goods. Wages were 46·7 per cent. of the net output in 1930, and 45·7 per cent. in 1935.

The Clothing Trades also showed a decline in the number of establishments between 1924 and 1935, from 7,740 to 6,960, but the numbers employed rose from about 474,000 to nearly 536,000. The net output per head fell from £151 to £143 in tailoring, etc., from £169 to £54 in boot and shoemaking, from £173 to £165 in hats and caps, and from £192 to £141 in all trades. The consumption of coal rose from 161,000 tons in 1930 to 178,000 in 1935, and that of electricity from 97 to 138 million B.T. units. This group of trades is one of small units, for 81·5 per cent. of the establishments employed under 50 persons and accounted for 36·1 per cent. of the total employees and 38·5 per cent. of the aggregate net output; firms with 100 to 499 employees had 16·6 per cent. of the establishments, but 42·2 per cent. of the workpeople and 40·4 per cent. of the net output. Really large establishments with 500 or more workers were only 1·9 per cent. of the total number, but accounted for 21·7 per cent. of the employees and 21·1 per cent. of the net output. In all cases except umbrellas, etc., the volume of production was less in 1924 than in 1935, in suits, costumes, etc., by 21 per cent., in boots and shoes by 18 per cent., in hats and caps by 34 per cent., in gloves (not knitted) by 52 per cent., and in fur goods by 21 per cent. Wages paid formed 53·6 per cent. of the net output in 1930 and 56·5 per cent. in 1935.

Although the results of 1935 do not compare favourably with 1924, there was generally an improvement as against 1930. In the Textile Trades total net output in 1930 was £147,700,000 and net output per head £139, the increases per cent. in 1935 being 6·6 and 7·2 respectively, and the decline in numbers employed was only 7,000 in the second period, compared with 200,000 in the first; in cotton, wool, silk, linen, jute, and ropes the net output per head was greater in 1935 than in 1930, there were small declines in hosiery and lace, and no change in textile finishing. The numbers employed in wool, silk, hosiery, and lace increased. The volume of production in 1930 was less than in 1935 in all trades (except textile packing) by percentages varying from 6 per cent. in ropes, etc., to 53 per cent. in silk and artificial silk. The Leather Trades do not tell quite the same story, for aggregate net output in 1935 (£10,700,000) was only 4·9 per cent. above that for 1930 (£10,200,000) and net output per head (£211) was 4·5 below that for 1930 (£221). An increase

of nearly 11 per cent. in employees in 1935 over 1930 accounts for the fall in net output per head. The volume of production in tanning and dressing and in making leather goods was respectively 13 and 16 per cent. less in 1930 than in 1935. The Clothing Trades showed an increase in aggregate net output of 3.3 per cent. between 1924 and 1930 and of 3.6 per cent. between 1930 and 1935, but, as the increases in numbers employed in the two periods were 4.0 per cent. and 8.7 per cent. respectively, the net output per head fell first from £160 to £159 (0.6 per cent.) and then to £151 (5 per cent.). The volume of production in all trades was greater in 1930 than in 1924 by percentages varying from 3.7 (boots and shoes) to 52.1 (gloves, not knitted). In considering all the changes in the money value of production, account must be taken of the changes in the prices of commodities. The Board of Trade general index of wholesale prices was 71.9 in 1930 compared with 100 in 1924 (taken as base) and in 1935 it was 89.0 compared with 100 in 1930 (taken as base).

There was a practically continuous fall in the general level of *wholesale prices* in 1938. The decline had started in the later months of 1937, after prices had attained their peak in July of that year. In July 1937 the Board of Trade index number of prices had risen to 111.5 (1930 = 100), or nearly 35 per cent. above that for March 1933 (82.7), the lowest point reached during the depression. The decline in 1938 as compared with 1937 amounted to 6.7 per cent., and was the first to be recorded since 1932, for which year the index number averaged 85.6.

As compared with December 1937 the prices of industrial materials and manufactures in December 1938 showed a fall of 6.9 per cent., and of articles of food 12.1 per cent. The decline in food prices was by far the greatest among the cereals, which registered a fall over the twelve months of rather more than 29 per cent., maize and rice alone showing any resistance to the decline. All groups of industrial materials and manufactures, except the non-ferrous metals, showed some decline in price compared with December 1937. In December 1938 the prices of copper and tin were 11 per cent. and 13 per cent., respectively, above the prices current twelve months earlier: in both cases the improvement in price took place during the last six months of the year. Apart from the fall in price of cereals, the most noticeable changes in price were in paper-making materials, chemical wood pulp declining from 40 to 50 per cent. over the twelve months, hemp 32 per cent., and raw wool 14 per cent. Raw cotton fluctuated during the first nine months of the year, but the changes from month to month were not very consider-

able, and during the last quarter of the year there was a stiffening at somewhat higher prices. There was a fall of from 5 to 6 per cent. in wholesale coal prices, principally among export qualities, and a slight decline in some classes of steel. For 1939 some reductions in iron and steel prices have been announced, but, apart from any increased requirements for armament purposes, the reductions proposed hardly seem considerable enough to increase the demand very appreciably. There was little movement in the prices of building materials during the year with the exception of a fall of rather more than 10 per cent. in the prices of certain building timbers.

The Board of Trade index numbers of wholesale prices from July 1937 onwards are given below :—

Averages for the year (1930 = 100).

Date	Total Food	Total net Food	All Articles	Basic Materials	Intermediate Products	Manufactured Articles	Building Materials.
July 1938	97.8	101.9	100.6	89.3	103.9	111.7	103.6
Aug. " " " " " "	94.7	101.9	99.5	90.5	103.1	111.5	103.1
Sept. " " " " " "	91.9	101.7	98.4	89.2	103.8	111.4	104.0
Oct. " " " " " "	92.6	102.4	99.1	91.1	103.7	111.6	104.0
Nov. " " " " " "	90.6	102.5	98.4	91.4	103.0	111.7	103.8
Dec. " " " " " "	91.8	101.7	98.3	89.9	102.5	111.2	103.5
Dec. 1937	104.4	109.2	107.6	106.9	107.7	114.1	105.0
" 1936	99.3	101.5	100.8	109.8	100.4	100.9	100.3
Year 1938	97.3	103.5	101.4	92.9	104.5	112.1	104.1
" 1937	102.2	112.0	108.7	122.9	108.9	111.4	104.2
" 1936	91.7	95.7	94.4	98.9	93.3	98.2	96.7

The figures of certain other British index numbers and the official index numbers of wholesale prices in France, Germany and the United States are given below for comparison :—

Date	Board of Trade (1930 = 100)	<i>Economist</i> (1927 = 100)	<i>Statist</i> (1866 = 77 = 100)	<i>The Times</i> (1913 = 100)	France (<i>Stat. Générale</i>) (1929 = 100)	Germany (<i>Stat. Reichsamt</i>) (1929 = 100)	U.S.A. (Bureau of Labour) (1926 = 100) *
Dec. 1937	107.6	77.2	97.3	123.9	100.6	76.9	81.6
July 1938	100.6	72.2	91.1	115.6	104.0	77.0	78.5
Dec. 1938	98.3	68.6	89.1	113.8	109.1	77.5	76.9

* Average of weekly figures.

All the British index numbers, as well as that for the United States, show an appreciable fall over the twelve months, while that

for France shows a rise of about 9 per cent., no doubt due to the depreciation of the franc. The almost stationary German index number—it has only varied between 76·8 and 77·5 during the year—makes it doubtful whether it can be accepted as a complete indication of the trend of wholesale prices in the country.

The average level of *retail prices* of articles of working-class consumption was slightly higher in 1938 than in 1937, the Ministry of Labour index number for such prices showing a rise of 1·3 per cent. The rise in foods prices only was slightly less—1·1 per cent. Apart, however, from seasonal fluctuations, prices generally showed a downward tendency, and at the end of the year the index number had declined about 2 per cent. compared with twelve months earlier. Food prices had declined about 4 per cent., but there was some slight increase in working-class rents and rates. The lowest point reached by this index number since 1920 was in May and June 1933, when food prices were 14 per cent. and general retail prices 36 per cent. above the level of July 1914. At the end of December 1938 the corresponding increases were 38 per cent. and 55 per cent. respectively. The most notable decreases during 1938 were in the prices of bread and flour, but the prices of nearly all articles of food moved in a downward direction, with the exception of that of tea, which showed an advance owing to the increased duty.

The Ministry of Labour's index numbers for recent months are given below, the prices at July 1914 being taken as 100.

	Aug. 1st, 1938	Sept. 1st, 1938	Oct. 1st, 1938	Nov. 1st, 1938	Dec. 1st, 1938	Dec. 31st, 1938	Jan. 1st, 1938	Jan. 1st, 1937
Food Prices ...	141	140	139	140	139	138	145	136
All Items (food, clothing, rent, fuel, etc.) ...	156	156	155	156	156	155	159	151
All Items (a year earlier) ...	155	155	158	160	160	159	151	147

The net effect of all the changes * in rates of wages reported to the Ministry of Labour during 1938 was a weekly increase of about £240,400. During each of the first five months of the year there was a net increase in wages to the workpeople involved in the changes, but in each of the following six months (June to November) there was

* Excluding changes in the wages of agricultural labourers, domestic servants, Government employees, shop assistants and clerks.

a net reduction. No reductions in wages, however, were reported during December 1938. The total number of persons who obtained net increases in wages during the year was 2,357,900, the increases amounting to £259,200 weekly. The number experiencing decreases was 321,750, and the weekly amount of such decreases was £18,800. In addition, about 161,000 persons experienced both increases and decreases during the twelve months, which left their general level of wages at the end of 1938 the same as at the beginning. In addition to the above, the minimum rates of wages of agricultural labourers in England and Wales were raised from 18. to 28. per week in 29 out of 47 Agricultural Wages Committee areas. There were also appreciable increases in wages in Admiralty industrial establishments and among manipulative grades in the Post Office, and also among shop assistants employed by co-operative societies and many private firms.

The Ministry of Labour estimates that for all industries (including agriculture) for which information is available the average level of full-time rates of wages at the end of 1938 was between 1 and $1\frac{1}{2}$ per cent. higher than at the end of 1937.

About 163,000 workpeople had their hours of labour reduced to the extent of about $2\frac{1}{2}$ hours per week and 1500 had their hours slightly increased.

The *net* number of workpeople involved in *trade* disputes causing stoppages of work in 1938 was 210,000, compared with 418,000 in 1937, and about 63,000 (205,000 in 1937) were thrown out of work at the establishments where the disputes occurred but were not themselves parties to the disputes. The total number of working days lost at these establishments owing to the disputes was 1,335,000, compared with 3,413,000 in 1937. There was no very considerable trade dispute during the year, and only two of them involved more than 5,000 workpeople. Disputes at various individual collieries caused the loss of 697,000 working days, or rather more than half of the total of such days lost. Three of these were protracted, and each involved the loss of from 90,000 to 100,000 working days.

The rise in *unemployment* which began in September 1937 was arrested to a slight extent by seasonal influences in February and March 1938, but throughout the rest of the year employment remained at a fairly uniform level below that of 1937. The mean rate of unemployment in Great Britain and Northern Ireland in the insured trades (excluding agriculture) was 12.9 per cent. in 1938, compared with 10.8 per cent. in 1937 and 13.1 per cent. in 1936. For Great Britain alone the corresponding rates were 12.6, 10.6, and 12.9, respectively. The rate of unemployment among insured

agricultural workers was 6·1 per cent. in 1938 and 4·4 per cent. in 1937 in Great Britain and Northern Ireland, and 5·5 and 4·1 per cent. respectively in Great Britain alone. The disparity between the rates of unemployment in December 1938 and December 1937 showed some considerable decline (12·9 and 12·1 per cent.), but as these figures represent the position at the middle of the month and at the height of the Christmas trade, they are not too safe a guide for the trend of employment. Apart from 1937, however, employment in 1938 was on a higher level than in any year since 1929, but unemployment increased in all areas during the year. The increase was least in the South-Eastern and South-Western Districts, in the Northern District and in Scotland, and was most considerable in the North Western District and in Northern Ireland. As in 1937, the rate of unemployment in Northern Ireland (28·3 per cent.) in 1938 was higher than in any other area, and is somewhat difficult to account for; since 1929 the rate of unemployment in this area has averaged over 25 per cent. and except on three occasions has never been below 20 per cent.

In 75 out of 103 groups into which the Ministry of Labour divides the insured trades (excluding agriculture) unemployment increased in December 1938 as compared with December 1937. The increase was most marked in iron-mining, pig-iron and steel manufacture and in the tinsplate industry, but it was also considerable in cotton-weaving, artificial silk manufacture and in the pottery trade. There were also appreciable increases in some of the miscellaneous metal trades. Fourteen industries covering over a million and a half workpeople had rates of unemployment in excess of 20 per cent. The rates for public works contracting and in the tinsplate industry were over 37 per cent., among dock labourers over 27 per cent., in shipping 26·8 per cent., and for steel manufacture and the linen trade over 24 per cent. In the woollen and worsted industry and in the carpet trade unemployment was not so great as in December 1937.

The average number of insured persons in employment in Great Britain (excluding agriculture) during 1938 was 11,406,000, compared with 11,497,000 in 1937. The number was lowest in January (11,319,000) and highest in October (11,455,000). Figures are complicated by reason of a revision of the statistics in September 1937, but it is probable that the highest number in employment was during August and September 1937, and that it was in the region of 11,700,000.

The proportion unemployed among persons engaged in agricul-

ture rose from 4.1 in 1937 to 5.5 per cent. in 1938 in Great Britain and from 12.2 to 19.2 per cent. in Northern Ireland. Apart from Northern Ireland unemployment was highest in Wales (10.6 per cent.) and in the Northern District (8.5 per cent.); it was lowest in the South Western District (3.0 per cent.). Women form but a small proportion (6 per cent.) of those employed in agriculture, but the rate of unemployment among females is apparently between five and six times that of males.

The number of workpeople aged 14 to 64 (insured and uninsured) on the registers of the employment offices of the Ministry of Labour in Great Britain are given below for the last six months of 1938 :—

Date	Wholly Unemployed	Temporarily Stopped	Persons normally in Casual Employment	Total
July 18th, 1938 ...	1,244,461	467,773	60,882	1,773,116
Aug. 15th, „ ...	1,262,343	439,024	57,875	1,759,242
Sept. 12th, „ ...	1,324,151	412,494	61,973	1,798,618
Oct. 17th, „ ...	1,408,932	307,947	64,348	1,781,227
Nov. 14th, „ ...	1,455,668	305,496	66,939	1,828,103
Dec. 12th, „ ...	1,474,019	294,708	62,645	1,831,372
Dec. 13th, 1937 ...	1,283,604	324,779	57,024	1,665,407
„ 14th, 1936 ...	1,365,035	194,841	68,843	1,628,719

The new *monthly index numbers of agricultural prices* now being issued by the Ministry of Agriculture are in several forms—two series showing prices corrected and uncorrected for seasonal fluctuations and two showing these series revised by taking account of the Government payments in respect of wheat, cattle and milk. As these payments are in effect additions to the ordinary prices, the two latter

Month				Uncorrected for seasonal variation		Corrected for seasonal variation	
				1937	1938	1937	1938
January	...	...	...	92	99	86	93
February	...	...	...	93	97	88	92
March	...	...	...	92	91	92	91
April	...	...	...	90	88	93	92
May	...	...	...	83	84	90	92
June	...	...	...	82	83	89	92
July	...	...	...	83	88	89	96
August	...	...	...	85	84	89	89
September	...	...	...	89	84	91	86
October	...	...	...	95	91	91	86
November	...	...	...	101	94	94	86
December	...	...	...	102	94	94	86

indices are given on p. 123, that is: (a) uncorrected for seasonal fluctuations and (b) corrected for seasonal fluctuations, with the Government payments included in each case, the base being the average annual price in the three years 1927-29 = 100.

It will be seen that when a straight comparison is made between the monthly price and the price in the base year, prices in 1938 showed a downward tendency though on the average they were only very slightly less than in 1937. If, however, these figures are corrected for seasonal fluctuations, the change from month to month is very much smoothed out, there being little movement in the first six months of 1938, though after a temporary rise in July there was a definite decline. The decline seems to have been chiefly in cereals, cattle and sheep.

The Ministry of Transport *Railway Return* No. 226 gives, in addition to the usual monthly figures, revenue and operating statistics up to the end of September 1938. Receipts which during the early months of the year had shown a tendency to continue their upward course of 1937, had by this date fallen well below the figures for that year, passenger traffic, at £45,641,746, showing a decline of 1·13 per cent., with goods traffic 5·99 per cent. lower at £67,167,080. Passenger journeys for the nine months totalled 945,677,000 (including 301,683,000 over the London Transport lines), having decreased by 85,165,000 or 8·26 per cent. This was largely due to comparison with the heavy Coronation traffic of 1937, but contributing factors were the general trade decline, the September crisis and the inclement summer. Freight tonnage fell by 10·35 per cent. to 204,494,000, the heaviest decreases being shown in general merchandise (11·1 per cent.), minerals (15·0 per cent.) and livestock (17·4 per cent.). Coal traffic, at 129,975,000 tons, was down by 8·6 per cent. The average length of haul rose slightly to 58·6 miles.

Notwithstanding the lower passenger traffics, passenger train mileage rose by 1·34 per cent. to 248,351,000, but the less rigid freight working arrangements enabled a reduction of 4·1 per cent. to be effected in freight train mileage. Lighter loading of trains is indicated by a fall of 14·0 per cent. in the mileage of assisting engines, the average load having fallen from 130·51 to 124·72 tons. This, however, facilitated a slight increase in the rate of movement at 9·15 train miles per train hour, with the result that the ton-mileage per engine hour showed only a relatively small decrease from 467·1 to 459·3.

Statistics are also given relating to the operation of 110 selected marshalling yards during the four weeks ended October 1st.

The gross traffic receipts published by the companies for the 52 weeks ended January 1st, 1939, are as follows :—

		Receipts	Decrease on previous year	
		£	£	Per cent.
Great Western (3,737 miles)	...	26,533,000	1,244,000	4.48
L.M.S. (6,831 miles)	...	63,194,000	3,203,000	4.82
L.N.E. (6,315 miles)	...	46,166,000	2,450,000	5.04
Southern (2,140 miles)	...	21,641,000	159,000	0.73
Total	...	157,534,000	7,056,000	4.29
London Transport (27 weeks)		15,324,000	159,000 (Inc.)	1.05 (Inc.)

2. OTHER STATISTICS.

The general decline in the *Value of Stock Exchange Securities* in 1937 was continued during 1938, apart from some reaction in April and July. As measured by the index number * published in the *Bankers' Magazine*, the fall in values over the year was 7.3 per cent., compared with 8.9 per cent. in 1937. Fixed Interest Stocks declined 6.2 per cent. (5.3 per cent. in 1937) and Variable Dividend Securities 9.6 per cent. (16.1 per cent. in 1937). The general index number (values at December 1921 = 100) stood at 112.4 in December 1938, 121.2 at December 1937 and 133.1 at December 1936. The index number for the fixed interest group at December 1938 was 116.3, or lower than at any date since November 1932. That for variable dividend securities was 104.4, and, apart from the figure for September of this year, had not fallen so low since May 1933. The decline over the year was greatest in British Ordinary Railway Stocks, which fell over 50 per cent., but British Railway Preference Stocks fell nearly as much (42.2 per cent.) and Railway Debenture fell (11.7 per cent.). Iron, coal and steel shares fell about 20 per cent., and foreign railway shares (other than U.S.) fell 24.6 per cent. United States railway shares fell only 3.4 per cent., but these shares had experienced a fall of over 40 per cent. in 1937, as indeed had the other foreign-railway stocks. Telegraph, oil, rubber, and shipping shares also fell appreciably in value, but gas, electric light and power showed only slight depreciation. British and Indian Funds fell 3.6 per cent.

* Based on the value of 365 representative securities.

In 1937 *shipping freights* were higher on the average than in any year since 1921, and were 50 per cent. above those for 1936. Rates declined, however, during the last three months of that year, and during 1938 declined still more, so that the average rate for the year was nearly 28 per cent. below that for 1937. As compared with 1929, rates for 1938 show a fall of 5 per cent. The revised index number of the Chamber of Shipping (1935 = 100) gives the average rate for 1938 as 126.9, compared with 175.6 in 1937 and 112.6 in 1936.

The statistics of *retail sales* prepared by the Bank of England in conjunction with the Association of Retail Distributors show that over the ten months February to November 1938 there was an increase of 2 per cent. over the retail sales in the corresponding ten months of 1937. This is a smaller increase than in any similar period since 1933, in which year and in the two preceding years decreases in comparison with previous years were shown. The sales of articles of food and perishables increased 4.3 per cent., but the sales of other articles declined by 0.6 per cent., the only branches of trade recording an increase in this section being those for boots and shoes and women's wear, the sales for which increased 2.2 per cent. and 2.9 per cent. over the period. The Ministry of Labour's index number of working-class food prices shows a slight decline during the same ten months, so that although the sources of the two sets of statistics are not quite the same, it is probable that the increase of 4.3 per cent. in sales is due to larger quantities disposed of. The index number of retail sales (average daily sales in 1933 = 100) for the ten months was 124.2, compared with 121.5 in the corresponding period of 1937, but the number for the month of November 1938 (130) was just below that for November 1937.

The *Statistics of Failures* in the United Kingdom and Ireland, issued annually by Mr. Richard Seyd, show a total for 1938 of 5,550 compared with 5,579 in 1937. These figures include 105 and 103, respectively, which were in Eire. Of the 1938 failures, 441 were in the financial, wholesale and manufacturing classes, 508 in the professions and 4,601 in retail trades, independent workers, etc. Of the failures in the first category (of which 197 occurred in London), the highest total was, as in other recent years, among the manufacturers and merchants of woollens, silks, etc., followed by warehouse-men and importers with 44, and "provisions" with 42. In the professional class, auctioneers, house agents and surveyors again head the list with 73 failures, against 37 in 1937. In the

retail trades, etc., class the largest numbers were builders (511), grocers (400), drapers (228), wireless dealers (170), plumbers, etc. (168). There were 325 failures among farmers.

In addition to the failures, 1,741 limited companies were wound up voluntarily, 544 in the wholesale, etc., trades, 56 among professional classes and 725 in the retail, etc., trades.

There was some decline in *employment* in Eire during the first ten months of 1938, but towards the end of the year there were some signs of recovery, and employment was on much the same level as in 1937. At the end of December 1938 the number of registered unemployed workers (88,380) was about 1,500 less than in December 1937.

The numbers reported as unemployed by the employment exchanges in Germany decreased rapidly month by month during the year. At the end of January the number was 1,051,745, and at the end of November 152,430. Seasonal causes raised the figure to 456,000 at the end of December 1938, but this was less than half the figure reported for December 1937 (994,784). In Austria also the number of persons reported as unemployed also decreased from about 400,000 in January to 150,000 at the end of December, 1938.

In France the numbers on the registers of the exchanges showed some increase each month in 1938 as compared with 1937, but the special monthly enquiry indicated increased employment in 1938. On the whole, the improvement during the twelve months was only to a limited extent. No doubt labour conditions have been complicated considerably in connection with the putting into force of the forty-hour week. In Holland and Switzerland employment was on about the same level as in 1937, but in Belgium some appreciable decrease was apparent. In the Scandinavian countries there was very little change, and in Poland there was some slight improvement. In Czechoslovakia during the first eight months of 1938 employment improved very considerably, but since August the information available does not permit of any comparison with previous figures owing to the altered area of the country.

In the United States employment improved appreciably during the latter half of the year, but the figures giving the numbers on the registers of employment exchanges in 1938 are not comparable with the much smaller figures in 1937, owing to the institution in 1938 of the system of unemployment insurance benefit in many states. Eligibility for these unemployment compensation payments has naturally caused largely increased registrations. The number of applicants for work registered at the public employment exchanges

comprised in or affiliated to the U.S. Employment Service was at the end of November 7,529,384, but it is stated that this figure included a large number of persons provided with employment on public relief schemes. In Canada employment in 1938 was on the whole not so good as in 1937, in New Zealand it was better and in Australia there was very little change.

According to the October Crop Bulletin of the International Institute of Agriculture, the *world wheat crop* in the 1938-39 season is the largest ever recorded, with the result that supplies up to the next harvest will be far in excess of demand. The effect on the wheat market may be judged by the fact that the price of British wheat in the middle of November, 1938, averaged 4s. 6d. per cwt. (20s. 3d. per quarter) as compared with 9s. 1d. per cwt. (40s. 10d. per quarter) at the same date in 1937.

World production in 1938 is estimated at 4,400 million bushels, which is 15 per cent. above the good crop of 1937, and 10 per cent. above the previous record crop of 4,000 million bushels in 1928. Dividing the crop between the two groups of importing and exporting countries, the out-turn in the exporting countries exceeds all previous maxima, but the production in the importing countries is only just equal to the maximum figure reached in 1933. The exceptional size of the crop is due in part to an increase in the area under cultivation, but mainly to favourable weather conditions which have resulted in a high average yield per acre. These October estimates are only provisional, but past experience with estimates made at this time of the year shows that the totals are usually subject only to slight modification.

After deducting the quantities required for internal consumption, the *exportable supplies* (including stocks carried over) available in the 1938-39 season are estimated at 1,135 million bushels, which is above the figures for the past five years. The increase is chiefly accounted for by the United States, Canada, Argentina and the Danubian countries, Australia showing a decrease. The probable *import requirements* to be met out of these supplies are likely to be very small. For the whole of Europe, including a supplementary demand for building up and increasing reserves, imports of 415 million bushels are forecast to which must be added 125 million bushels for extra-European countries.

The net result is that with supplies available for export amounting to 1,135 million bushels and requirements of only 540 million bushels, the surplus at the end of the 1939 season is estimated as amounting to 595 million bushels or more than a year's normal imports. This

figure is approximately equal to the record figure of 1933, and establishes a new disequilibrium between supply and demand, of which the present depression in the wheat market is the obvious result.

"World Wood Pulp Statistics (Second Edition), 1926-1936," published by the United States Pulp Producers Association, is the standard source of authoritative statistical data on the wood-pulp industry. Although this issue is now over a year old, it is nevertheless of great interest. Wood pulp is one of the world's great industries, the scale of which has grown enormously since the war (in the twelve years under review, 1925-36, world output increased from 13.96 to 23.19 million short tons), and its expansion has by no means ceased. The largest producers of wood pulp are naturally the countries with great forests. The U.S.A. comes first, with 24.7 per cent. of the 1936 output; Canada next with 19.7 per cent.; Sweden, Finland, and Norway together produced 28.7 per cent. (their respective proportions were 15.0 per cent., 9.2 per cent., and 4.5 per cent.); Germany accounted for 11.0 per cent.; Japan for 3.7 per cent.; Russia for 3.3 per cent.; and all other countries for less than 2 per cent. each. The consuming countries were, first, the U.S.A., which took 33.8 per cent. of the world total in 1936; followed by Canada (16.5 per cent.), Germany (10.7 per cent.), Great Britain (8.1 per cent.), and Japan (5.3 per cent.). The chief use of wood pulp is, of course, the manufacture of paper; and when allowance is made for the export of paper of all kinds by the producing countries, the consuming picture alters somewhat, the true Canadian consumption in particular being rather sharply reduced. The United States Pulp Producers Association are to be congratulated on the service they have rendered students of the wood-pulp industry, as well as students of international economic problems generally, by the admirable collection of data brought together in this volume.

The first general *population census of Turkey* took place in 1927, the second followed in 1935, and the official report thereon has just been published in a quarto volume of xxviii + 404 pp., prefaced by a report on methods in Turkish and French. The tables are also in those two languages. In the eight years the aggregate population has increased from 13,648,000 to 16,158,000, all the main territorial divisions sharing in the growth. About 86 per cent. of the population gave Turkish as their mother tongue, but it is curious to observe

that 30 other languages are recorded besides "autres" and "inconnus". The usual details as to sex, age, birthplace, religion, education, and occupations are given.

Towards the end of 1937 the International Labour Office issued a report on "*The World Textile Industry; economic and social problems*" in two octavo volumes (vii + 288 pp. and viii + 354 pp., 8s. each). The first volume treats of the scope of the industry, its raw materials, manufacturing, world trade, changes in production and trade, "over-production" and "under-consumption," international competition, the labour force, wages, hours, and employment. The second volume is occupied with international statistics of production, consumption, trade, labour, wages, and value of output; it also contains a report of the proceedings of the Tripartite Technical Conference of the Textile Industry, held in Washington, D.C., in April 1937.

From the League also has come in the summer of 1938 their indispensable volume on *World Production and Prices* (137 pp., 4to., 5s.). It covers the year 1937, with some outlook on 1938. The form is modified and the statistics of production and stocks of primary commodities have been carried back to 1920. Record levels of world production were shown in 1937, total primary production being 10 per cent. higher than in 1929 and visible stocks 6 per cent. lower, but the upswing which started in 1932 came to an end by the middle of 1937. Output per hour and output per worker were both greater than in 1929. With this report may be read *World Economic Survey, 1937-38* (244 pp., 8vo., 6s.), which has been prepared by Mr. J. A. Meade. The chapter headings are: the decline in business activity, employment and wages, production and stocks, prices, money and finance, international trade, balances of payments and foreign exchange, commercial policy, and present economics, and this list must serve as an indication of the contents of an important book which it is impossible to summarize.

A Report on International Trade (iii + 302 pp., 4to., 8s. 6d.), issued by P. E. P. in May 1937, may usefully be studied along with the League of Nations' publications. It surveys the problems affecting the expansion of international trade and makes proposals for the development of British commercial policy and export mechanism. A policy of non-discrimination in the Crown Colonies, the modifica-

tion of the most-favoured-nation clause, the supplementing of bilateral agreements by international cartels, the development of a new export technique, increased lending for overseas reconstruction and development are among the recommendations. As is general with P.E.P. publications the discussion is acute and detailed, and in an appendix a few necessary statistics are given.

By a decree of 1935 a National Commission was set up for the taking of an industrial census of the Argentine for that year and the results of its labours are contained in *Censo Industrial de 1935*, a massive quarto volume of xlv + 750 pp. Statistics of occupations, wages, and hours of work are also included, as well as the value of production, cost of materials, and capital invested. Students will find the details interesting. Food products, naturally, occupied more than a quarter of the 40,600 establishments; textiles and machinery and vehicles accounted each for about 12 per cent., and paper and metals each for about 10 per cent.

Recent political happenings lend an interest to *Deutschum in aller Welt*, by W. Winkler (1938 : Wien, Deuticke, pp. 160, 3 R.M.), which is composed of tables showing the German population of the Reich (including Austria) by areas, age, speech, and religion; also migration figures. For 19 other countries, not including Great Britain, similar figures, based on official statistics, are given as far as possible. Figures for the years 1910, 1921, and 1930 are given for Czechoslovakia, showing a reduction in the German-speaking population of Bohemia and Moravia between 1910 and 1930.

No. 3, Volume 1, of the *Revista de Estadística* of Mexico was issued in 1938. Its contents include manufactures, extractive industries, electricity, finance, agriculture exports and imports, shipping, social statistics, building, etc. The text is in Spanish.

Somewhat belatedly attention must be drawn to the publications of the *Statistical Institute for Economic Research of the State University of Sofia*, the first two parts of which were published in 1937. The main language used is, of course, Bulgarian, but summaries are provided in German or French or English. The chief contributions

are by Professor O. N. Anderson, who has a short article in No. 1 "On the Question of the Construction of an Internationally Comparable Index of Production," and by Professor Tchakaloff, whose investigations into "The National Income of Bulgaria, 1924-35," occupy the whole of Part II; there are summaries in English of these two articles.

CURRENT NOTES

The League of Nations having decided to issue in pamphlet form certain of the reports of the Committee of Statistical Experts has now published four. The Committee includes our Fellows, Sir A. W. Flux, M. M. Huber, and Mr. J. W. Nixon. Report No. 1, *Statistics of the Gainfully-Occupied Population* (pp. 32, qto., 1s.), gives the definitions of "gainfully occupied" adopted by the Committee and the principles of classification by branches of economic activity, by personal status, and by individual occupation. A specimen table and a minimum list of nomenclature of industries are annexed. No. 2, *Minimum List of Commodities for International Trade Statistics* (pp. 62, qto., 2s.), explains itself. The work of compiling it was arduous, but has been justified by its adoption by 25 countries, most of which now publish statistics classified in this way, without interfering with the publication of their own trade statistics in greater detail. Comparison will be much facilitated as this system becomes general. No. 3, *Timber Statistics* (pp. 17, qto., 9d.), details a minimum programme for the organization of the production of, and international trade in, commercial timber. No. 4, *Statistics relating to Capital Formation* (pp. 22, qto., 1s.), is a note on the methods of ascertaining savings, funds available for investment, and new acquisitions of capital. The Committee recognize that "the problem of capital formation is extremely complex and difficult to subject to exact statistical measurements." They propose to study first banking statistics, statistics of capital issues, and insurance statistics, and "hope to continue in the near future with statistics of balance-sheets and profit-and-loss accounts."

In November 1934 the Minister of Finance for Éire appointed a Commission of 21 members (of whom three, Professors Busted and Gregory and Mr. Eason, are Fellows of this Society) "to examine and report on the system in Saorstát Éireann of currency, banking, credit, public borrowing and lending, and the pledging of State credit on behalf of agriculture, industry and the social services, and to consider and report what changes, if any, are necessary or desirable to promote the social and economic welfare of the community and the interests of agriculture and industry." The fruits of their labours now lie before us in the shape of three stout octavo volumes—one of Reports (xxxi + 694 pp., 5s.) and two of Memoranda and Notes

of Evidence (iv + 1448 pp. 7s. 6d. each vol.). The witnesses heard vary from public departments, the Dublin Stock Exchange, chambers of commerce, trade unions, farmers, and builders to the Free Economy Federation of Great Britain and the Financial Freedom Federation. The Majority Report is signed by 16 members, with the usual apparatus of Addenda and Reservations made by seven of them; five others produced three Minority Reports. There are 32 appendices to the Majority Reports, containing statistics and critical and elucidatory notes.

The most important conclusions of the majority are that the present system of linking the Saorstát pound to sterling at the existing parity should be maintained; that the Consolidated Bank-notes issued by the banks should be withdrawn; that the issue of notes by the Currency Commission has worked satisfactorily; that a money market based on Treasury Bills should not be set up; that a special department of the monetary authority should be established to carry out comprehensive studies of economic and financial data; that direct and confidential contact should be maintained with the monetary authorities of other countries, particularly those in the sterling area; that the monetary authority should be allowed to rediscount commercial, agricultural, and livestock (but not Treasury) bills, to buy and sell securities (Government securities bought to have been outstanding for two years at least), and to receive non-interest-bearing securities from public authorities and credit institutions. The present extent to which the State participates in the financing of agriculture and industry is examined in detail.

The Transactions of the Manchester Statistical Society for 1937-38 lie before us. This little octavo volume of xvii + 167 pages, exclusive of charts, contains five papers read at ordinary meetings of the Society and six read at group meetings. Only Mr. Connor's paper on "Charts Illustrating the Trade Cycle" in the first series and, in a lesser degree, Mr. Jarman's paper on "Some Social Aspects of Slum Clearance" in the second are strictly statistical. Monetary topics form the subject-matter of four papers, and the others deal with treaties of commerce, marketing of coal, "the turn of the boom," petroleum, and public utility integration. It will thus be seen that the Society takes a wider view of its sphere of interest than would have been admitted by the Founders of our Society. Any stretching of the definition of statistics which excluded Mr. D. H. Robertson's paper on "A Survey of Modern Monetary Controversy" would, however, have deprived students of an extremely valuable contribution. It is not saying too much to declare that

any participant in monetary controversy would be well-advised to keep Mr. Robertson's paper permanently by his side and study it word by word in order to be sure of keeping to the facts of life and of avoiding the barren logomachies which make up so much of the disputation on this subject. Mr. Connor's paper contains some controversial matter on methods of "smoothing." Another highly informative paper is the one by Mr. Roberts on "Changes in the Marketing of Coal brought about by the Coal Mines Act of 1930." Altogether this volume maintains the standard established by its predecessors.

In their series of Reprints of Scarce Books on Political Economy the Publications Department of the London School of Economics have now issued *Three Studies on the National Income*, by Professor A. L. Bowley and Sir Josiah Stamp. These are the investigations which are regarded as the standard sources of information for their respective periods—namely, "The Division of the Product of Industry," relating to the pre-war years; "The Change in the Distribution of the National Income, 1880-1913," by Professor Bowley, and "Our National Income, 1924," by Professor Bowley and Lord Stamp. All three have been out of print for some time, and are reprinted by permission of the Oxford Press, the original publishers. Their reappearance in a single compact volume is an immense boon to those concerned with the study of our national economy.

Francis Bisset Hawkins, M.D., was one of the Founders of the Royal Statistical Society and a member of its first Council. He died in 1894, and in 1896 a benefaction was made to the Royal College of Physicians for the purpose of perpetuating his memory. Accordingly a Gold Medal was established "to be bestowed triennially on some duly qualified medical practitioner, who is a British subject, and who has, during the preceding ten years, done such work in advancing Sanitary Science, or in promoting Public Health, as, in the opinion of the College, deserves special recognition." That Bisset Hawkins Medal was conferred on our late Fellows Sir W. H. Hamer (in 1920) and Dr. T. H. C. Stevenson, C.B.E. (in 1932), and has now been awarded to our Past-President, Professor Major Greenwood, F.R.S.

The Royal Society has awarded a Gold Medal to our Fellow, Professor R. A. Fisher, F.R.S., for his work in statistical science.

This appears to be the only award of a medal by that Society for specifically statistical work, except that of the Darwin Medal to Karl Pearson in 1898 and that of the Buchanan Medal to Professor Greenwood in 1927.

The London School of Economics and Political Science announces that the first award of the Bowley prize has been made to Mr. H. S. Booker, M.Sc. Econ., a Fellow of this Society, for an essay on "Aspects of Food Consumption with Special Reference to Milk."

The Senate of the University of London invites application from members of the University and teachers in its schools for grants to assist specific projects of research. Particulars and forms of application (to be returned by March 31st) may be obtained from the Academic Registrar, the Senate House, University of London, W.C.1.

The Agricultural Economics Society has decided to offer two annual prizes of £10 and £5 respectively for essays on a subject selected from some recognized field of Agricultural Economics. Competitors must be either students at recognized institutions, or holders (of not more than *four* years' standing) of degrees and/or diplomas in agriculture and/or economics. Essays for the current year must be sent in by the 31st March, 1940.

Further details will be supplied on request to The Secretary, The Agricultural Economics Society, University of Reading, 7, Redlands Road, Reading.

OBITUARY

ALFRED HOARE

ALFRED HOARE, Fellow of this Society, died on November 6th, 1938, at the age of 88. In his long life he was successively mathematician, surgeon, banker, social reformer, scholar, and economist. Though he was 14th Wrangler in 1873 (St. John's Cambridge, was his college) and afterwards qualified as a surgeon, he did not follow up either mathematics or medicine, but entered the family bank, in which he became a partner in 1882. He must have been one of the last partners in a private bank to "sleep over the bank," but banking did not occupy all his activities. When the London County Council was formed he, as a Progressive member, was chairman of its First Finance Committee, and afterwards an alderman. The work of the Charity Organization Society, the East End Dwellings Company and the Tenement Dwellings Company claimed much of his time and energy. Still insatiable, scholarship attracted him and we must note the erudite and successful Italian Dictionaries of 1915 and 1919.

His interest in economics dates back at least to the founding of the Royal Economic Society, of which he was Honorary Treasurer, for he served on its Council from the beginning till 1892. He was elected a Fellow of the Royal Statistical Society in 1919 and served on the Council from 1924 to 1932 except for one year's interval.

The *Journal*, Part III, 1925, contains a report of the only paper he read before the Society, entitled "The Bearing of Labour Unrest upon the Path to be taken to Sound Currency." The central theme of "this shrewd and interesting paper" (as Mr. Keynes called it) was the ignorance of labour affairs characteristic of "the monetary element in London." "I conclude, on the whole," he said, "that the policy to be adopted is that of increasing the income tax little by little so as to have a substantial budget surplus every year and utilizing part of this surplus in such a way as to stimulate employment, mainly on the lines travelled by the Public Works Loan Commissioners, and at pre-war rates of interest, another part for deflation, and the rest for redemption of debt." That paper, and still more his private conversation, showed he was not afraid of being unorthodox, though one sometimes afterwards suspected that his "crankiness" was designed to provoke discussion. His insistence in that same discussion on "the moral influence of the power of taxation upon the willingness of the worker to have his monetary wages reduced" may perhaps be instanced as an example of the force of his imagination.

Increasing infirmities made him a less frequent attender at the Society's meetings in recent years, but he kept up his attendance at the Statistical Dinner Club (to which he was elected in 1925), and he was present at the last Dinner (June 1938) before his death. His colleagues will long lament his empty chair, for a man of such genial friendship, such wide interests, such long experience, such original and provocative thought is one to be remembered through the years.

H. W. M.

A. W. WATERLOW KING

ARTHUR WILLIAM WATERLOW KING, who died on the 30th December, 1938, in his seventy-eighth year, had completed forty years' membership of the Society, and during the whole of that time had taken an active part in its conduct. King represented a type of Fellow to which the Society is under a heavy obligation, but one which is unfortunately becoming increasingly rare—the interested and intelligent non-specialist. He made no claim to be regarded as a statistician; he never read a paper before the Society or contributed to the *Journal*; and there is no record that he ever spoke at its public meetings. To many, perhaps most, of the Fellows he cannot have been more than a name. But the Society owes very much to him. He had a keen appreciation of the significance of statistical work and of the importance of the Society's objects; and to its service he devoted unsparingly his energy and ability and the long experience gained in many years' direction of the publishing concern of P. S. King and Son, he being the "Son." First elected to the Council of the Society in 1903, he served on it, with a few short interruptions, to the end of his life; he was a Vice-President from 1918 to 1920, and again from 1932 to 1934; and in 1934 he became Treasurer. From 1899 to 1933 he was a member of the Library Committee. In all these capacities his colleagues learned increasingly to value his ready sympathy, his clear judgment and applied knowledge; and to respect the man.

The loss of Waterlow King, great as it is to the Society, will be felt even more severely in the Statistical Dinner Club, of which he had been a member since 1906. From 1925 he occupied its sole office, that of Treasurer. The "custom of the constitution" of the Dinner Club has made the Treasurer an autocrat whose actions may be discussed but are never disputed. But King's was a benevolent despotism, and his geniality, his unfailing courtesy, and his dry humour will be remembered in the Club with gratitude and affection.

P. A.

STATISTICAL AND ECONOMIC ARTICLES IN RECENT PERIODICALS

UNITED KINGDOM—

Agricultural Economics Society, Journal of Proceedings, December, 1938—Agricultural marketing, with special reference to potatoes: *W. Gavin*. Agriculture and national defence: *Professor A. W. Ashby*.

Annals of Eugenics, August, 1938—The elimination of the influence of repetition on the score of a psychological test: *R. M. W. Travers*. Studies on a child population, IV. The form of the lower end of the frequency distribution of Stanford-Binet intelligence quotients and the fall of low intelligence quotients with advancing age: *J. A. Fraser Roberts, R. M. Norman, and Ruth Griffiths*. Three nomograms for testing agreement of blood grouping data with theories of inheritance: *W. C. Boyd*. The statistical utilization of multiple measurements: *R. A. Fisher*.

The Banker—

November, 1938—Germany after Munich: *W. G. J. Knop*. Scottish trade and industry: *C. J. Shimmins*.

December, 1938—The future budgetary problem: "*Economist*." Rearmament and its finance to date: *L. G. Newton*. Rearmament and the balance of payments. Rearmament finance overseas: *W. G. J. Knop*.

January, 1939—The Exchange Account's new tactics: *Paul Einzig*. Economics of the Highlands: *C. J. Shimmins*. The British banking year.

Bankers' Magazine—

November, 1938—The American gold problem: *Sidney Weintraub*.

December, 1938—The history of the cheque: *R. A. Wilson*. Shipping and shipbuilding: *E. T. Good*.

January, 1939—International monetary co-operation: *R. G. Hawtrey*. The farmer's year and his banker: *F. A. Willman*.

Chartered Surveyors' Institution, Journal—

December, 1938—The presidential address of *Sir Charles Bressey, C.B.*

January, 1939—Structural A.R.P.: *E. L. Bird*. The Coal Act 1938 (Part 1), unification of ownership of coal: *A. R. Thomlinson*.

UNITED KINGDOM—*Contd.*

Economica, November, 1938—Causes of changes in gold supply : *F. W. Paish*. The influx of labour into the Midlands, 1920–37 : *Brinley Thomas*. Commodity stocks in the trade cycle : *L. M. Lachmann* and *F. Snapper*. Mr. Hawtrey on short and long term investment : *N. Kaldor*.

Economic Journal—

September, 1938—The movement of real and money wage rates : *J. T. Dunlop*. Determination of the multiplier from national income statistics : *Colin Clark*. The policy of government storage of food-stuffs and raw materials : *J. M. Keynes*. The national economy of Germany : *T. Balogh*.

December, 1938—British oversea investments, 1937 : *Sir R. Kindersley*. Stability and full employment : *N. Kaldor*. Price dispersion in periods of change : *H. W. Singer*. Variability of railway operating costs : *E. J. Broster*. The value of life : *J. Meyler Symmons*.

Eugenics Review, October, 1938—Growth of Education in England and its influence on size of family : *Grace G. Leybourne*. Reproduction rates for départements of France, 1891–1931 : *D. V. Glass*.

Geographical Journal, November, 1938—Geographical aspects of the industrial evolution of London till 1850 : *O. H. K. Spate*.

Institute of Actuaries, Journal, Part II, 1938—The census method of investigating mortality with special reference to the annuitants' experience 1931–35 : The late *Herbert Buxton Smither*.

Institute of Actuaries Students Society, Journal, No. 2, 1938—Recent trends in national finance : *H. W. Haycocks*.

Institute of Bankers, Journal—

November, 1938—Finance and the crisis : *N. Crump*.

December, 1938—Inaugural address of the President, *R. A. Wilson*.

January, 1939—The bearing of recent American experience on economic theory : *Lord Stamp*.

Lloyds Bank Ltd. Monthly Review, November, 1938—India financial and economic progress : *Sir Stanley Reed*.

The Manchester School, No. 2, 1938—The rôle of statistics in monetary affairs : *W. F. Crick*. Unemployment and the diversification of industry : *R. C. Tress*. The settling down of capital and the trade cycle : *M. Polanyi*. The co-ordination of gas and electricity supply : *P. Chantler*.

UNITED KINGDOM—*Contd.*

Population, August, 1938—Population phenomena in Amsterdam: *J. H. van Zanten* and *T. van den Brink*. Taux de reproduction et autres indices démographiques des départements français (1911-13 et 1930-32): *Pierre Depoid*. Logistic law of growth and structure of Indian population: *Satya Swaroop* and *R. B. Lal*.

Public Administration, October, 1938—Government planning machinery: *Sir Henry N. Bunbury*.

Review of Economic Studies, Vol. VI, No. 1—The marginal propensity to consume and the multiplier, a statistical investigation: *R. and W. M. Stone*. Elasticity of demand and stabilisation: *Helen Makower*. The establishment of the jute industry: a problem in location theory?: *D. Chapman*.

Royal Society of Edinburgh, Transactions, Vol. LIX, Part II—Differential fertility in Scotland, 1911-1934, Part I: *Enid Charles*.

Sociological Review, October, 1938—Childless marriages: *R. R. Kuczynski*. A study of population in Ulanga, Tanganyika territory: *A. T. and G. M. Culwick*. A study in the industrial career of secondary school boys: *Gertrude Williams*.

Statistical Research Memoirs, December, 1938—Contribution to the theory of "Student's" *t*-test as applied to the problem of two samples: *P. L. Hsu*. Contributions to the theory of testing statistical hypotheses. Part II, Certain theorems on unbiased critical regions of type A. Part III, Unbiased tests of simple statistical hypotheses specifying the values of more than one unknown parameter: *J. Neyman* and *E. S. Pearson*. Limiting distributions connected with certain methods of sampling human populations: *F. N. David*.

UNION OF SOUTH AFRICA—

South African Journal of Economics, September, 1938—Some aspects of the European coal position: *P. H. Guénault*. Some notes on the scientific validity of forecast in economics: *J. N. Reedman*. Planning and control in agriculture: *P. R. Viljoen, J. R. McLoughlin* and *Professor C. S. Richards*.

UNITED STATES—

American Academy of Political and Social Science, Annals, November, 1938—Freedom of inquiry and expression. [Whole number.]

UNITED STATES—Contd.

American Economic Review, December, 1938—Public expenditures and taxes: *A. G. Buehler*. Gold-mining taxation in South Africa: *Edmund Whittaker*. Rising costs and business-cycle crisis: *Randall Hinshaw*. Comparability of public debts: *D. P. Meyers* and *P. A. Wicks*.

American Statistical Association, Journal—

September, 1938—How to study the social aspects of the depression: *Edwin B. Wilson*. The χ^2 test of significance: *Thorn-ton C. Fry*. [Also other papers on the χ^2 test, by various authors.] Punched card technique for the correction of bias in sampling: *C. W. Vickery*. Problems in the measurement of physical volume of output: *Solomon Fabricant*.

December, 1938—The misuse of statistics: *J. B. Cohen*. Interest and dividends in the balance of international payments: *Paul D. Dickens*. The standard deviation of sampling for life expectancy: *Edwin B. Wilson*. Measures of changes in fertility in Germany: *C. and I. B. Taeuber*.

Annals of Mathematical Statistics, September, 1938—Interior and exterior means obtained by the method of moments: *E. L. Dodd*. On the Chi-Square distribution for small samples: *P. G. Hoel*. Shortest average confidence intervals from large samples: *S. S. Wilks*. Transformations of the Pearson type III distribution: *C. A. Olshen*. A test of the significance of the difference between means of samples from two normal populations without assuming equal variances: *D. M. Starkey*.

Econometrica, October, 1938—Étude particulière d'une loi de demande; le trafic postal en France de 1873 à 1936: *René Roy*. The significance of the characteristic solutions of mixed difference and differential equations: *R. W. James* and *M. H. Belz*. The theoretical derivation of dynamic demand curves: *Gerhard Tintner*. A mathematical note on democracy: *K-G. Hagstroem*.

Harvard Business Review, Vol. XVII, No. 1—Earning power with respect to the size of corporations: *W. L. Crum*. The influence of interest rates upon entrepreneurial decisions in business—a case study: *J. Franklin Ebersole*. Where is installment selling headed?: *Carl N. Schmalz*. Installment selling: a critical view: *J. D. Weiss*.

Journal of Political Economy, October, 1938—The silver episode, I: *H. M. Bratter*. Business cycles in Japan before 1853: *W. A. Spurr*. Economic aspects of soil conservation: *W. W. Wilcox*.

UNITED STATES—*Contd.*

Quarterly Journal of Economics, November, 1938—The expansion power of the English banking system: *L. L. Watkins*. Protection and the historical situation: Australia: *K. L. Anderson*. Determination of reproduction cost with index numbers: *C. Emery Troxel*. The propensity to consume: *E. W. Gilboy*.

Review of Economic Statistics, November, 1938—An analysis of changes in Federal finances, July 1930–June 1938: *Dan Throop Smith*. Savings, investment, and the problem of neutral money: *William Fellner*.

Social Research, November, 1938—The Trojan horse of democracy: *F. A. Hermens*. International trade under totalitarian governments: *Arthur Feiler*.

Wheat Studies of the Food Research Institute—

November, 1938—Wheat futures prices and trading at Liverpool since 1886: *Holbrook Working* and *Sidney Hoos*. [Whole number.]

December, 1938—The world wheat situation, 1937–38. A review of the crop year: *Joseph S. Davies*. [Whole number.]

DENMARK—

Nationaløkonomisk Tidsskrift—

Hefte 4, 1938—Konjunkturstatistikk og Konjunkturprognose: *Erling Petersen*. Er min Undersøgelse af det engelske smørmarked Vædiløs?: *Jorgen Pedersen*.

Hefte 5, 1938—Offentlig Investeringskontrol og økonomisk Initiativ: *Niels Lindberg*. Permanent Krisepolitik?: *F. Zeuthen*.

FRANCE—

Bulletin de la Statistique de la France, Octobre–Decembre, 1938—L'agglomération parisienne et ses migrations alternantes en 1936: *Henri Bunle*.

Journal de la Société de Statistique de Paris—

Août–Septembre, 1938—La statistique dans les pays coloniaux: *Henri Ulmer*. Discussion ayant suivi la communication de *M. Delaporte*: “Evolution de la mortalité française depuis un siècle.”

Octobre, 1938—Discussion ayant suivi la communication de *M. Forest*: “Essai d'étude statistique sur les tests mentaux.”

Décembre, 1938—Comment prévoir les cours du blé: *M. Courcon*. La statistique de la population autrichienne: *G. Ichok*. Les entreprises privées d'assurances en Suisse en 1936: *A. Barriol*.

FRANCE—Contd.

Revue d'Economie Politique, Septembre-Octobre, 1938—Quelques observations sur les relations entre la vitesse d'accroissement de la production d'or et les mouvements, des prix : *Charles Rist*. Quelques observations relatives à l'influence des variations de la production de l'or sur les mouvements de longue durée des prix : *Louis Baudin*. Les causes des variations dans l'offre de l'or : *J. W. Paish*.

GERMANY—

Allgemeines Statistisches Archiv, Heft 2, 1938—Die italienische Bevölkerungsbewegung und die faschistische Bevölkerungspolitik : *Franco Savorgnan*. Zeitfragen der Aussenhandelsstatistik : *Fritz Soltan*. Österreichs Betrag zur wissenschaftlichen Statistik : *F. Klezl-Norberg*. Das Geschlechtsverhältnis der Geborenen 1933-34 : *Franz Reichert*.

Archiv für mathematische Wirtschafts- und Sozialforschung, Heft 3, 1938—Über die Erfolgsaussichten von Massnahmen gegen Erbkrankheiten (II) : *Otfried Mittmann*. Der Befall der Gebäude durch den Hausbockkäfer : *H. Schmidt*. Eine nomographische Behandlung des Zinsfussproblems in der Lebensversicherung : *Günther Wünsche*.

Vierteljahrshefte zur Wirtschaftsforschung, Heft 2, 1938-39—Strukturwandlungen des Welthandels. Ein Beitrag zur Frage : Industrialisierung und Aussenhandel : *Richard Seiler*. Entwicklungstendenzen der internationalen Eisenwirtschaft im letzten Jahrzehnt : *K. G. Mahnke*.

Weltwirtschaftliches Archiv—

September, 1938—Die Abhängigkeit des Preisniveaus von der Geldmenge : *Bertrand Nogaro*. Budgetausgleich und Konjunkturverlauf : *Carsten Welinder*. Die Wirtschaftlichen und politischen Probleme der Sowjetukraine : *Boris Ischboldin*.

November, 1938—Zur Konkurrenz und Preisbildung auf vollkommenen und unvollkommenen Märkten : *Erich Schneider*. Das Problem einer Wechselwirkung zwischen Bevölkerungs- und Wirtschaftsentwicklung : *August Lösch*.

ITALY—

Le Assicurazioni Sociali, N. 4, 1938—Rassegna demografica. Che cosa insegnano le nostre tavole di vita e di morte circa il prolungamento della vita italiana : *Alfredo Niceforo*. L'assicurazione per le malattie della gente di mare : *Fernando Ghiglia*. [A Supplement contains these articles in French.]

ITALY—*Contd.*

Economia, Novembre, 1938—Analisi comparativa della prolificità dei matrimoni con prole: *Eugenio D'Elia*.

Giornale degli Economisti e Rivista di Statistica—

Ottobre, 1938—Sullo studio delle distribuzioni statistiche nella dinamica economica: *Silvio Vianelli*. Di una proprietà della media geometrica: *M. De Vergottini*.

Novembre-dicembre, 1938—I traffici dell'Italia con l'estero nel 1929 a nel 1937: *Libero Lenti*. Ciclo e svolgimento dinamico: *U. Forlano*.

Rivista di Storia Economica, Settembre, 1938—Il contenuto essenziale della teoria del valore di Ricardo: *Mario Lamberti*. L'ufficio delle premesse teoriche nell'indagine storica, con alcune riflessioni sulle cause della decadenza della Spagna: *Luigi Einaudi*.

Supplemento Statistico—

N. 1, 1938—La mortalità dei neonati provenienti da parti plurimi: *Franco Savorgnan*. Probabilisti di Cambridge: *Bruno de Finetti*.

N. 2, 1938—Sul "metodo dei profili": *Corrado Gini*. La statistica italiana del anno XVI: *Gastano Pietra*.

POLAND—

Baltic and Scandinavian Countries, September, 1938—Population problems in Poland: *Wiktor Ormicki*. Problems of transit trade in Europe: *Antonio Giordano*.

SWITZERLAND—

Journal de Statistique et Revue Economique Suisse, Heft III, 1938—Zur Berechnung einer Indexziffer der Kosten der Lebenshaltung: *H. Gordon*. Internationale Kapitalsübertragungen: *P. Mombert*. Die Überalterung der schweizerischen Bevölkerung: *W. Bickel*.

INTERNATIONAL—

International Labour Review—

October, 1938—The mobilisation of labour reserves in Germany: *H. Vollweiler*.

November, 1938—The mobilisation of labour reserves in Germany: II: *H. Vollweiler*. A historical survey of factory inspection in Great Britain: *D. H. Blelloch*.

December, 1938—Public works as a factor in economic stabilisation. Wages policy and business cycles: *E. Ronald Walker*. Labour legislation in Indian states: *Rajani Kanta Das*.

INTERNATIONAL—*Contd.*

International Labour Review—

January, 1939—Industrial fluctuations and wage policy : *Emil Lederer*. African labour problems : *Wilfrid Benson*.

Revue de l'Institut International de Statistique, Livr. 3, 1938—On the statistics available concerning the occupied population of the world and its distribution : *J. W. Nixon*. Charge fiscale, bilan fiscal, capacité fiscale du contribuable : *G. Hostelet*. La XXIV^e session de l'Institut International de Statistique, Prague, 1938 : *M. Huber*. Observations sur le rapport présenté par *M. le Prof. Winkler*, "La baisse de la natalité, ses causes, et ses conséquences économiques et sociales" : *F. Burgdörfer* and *L. Livi*.

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Since the issue of Part IV, 1938, the Society has received the publications enumerated below :—

I.—OFFICIAL PUBLICATIONS.

(a) United Kingdom.

Agriculture and Fisheries, Ministry of—

Economic series, 2. Report of the Committee on Stabilisation of Agricultural Prices. 1925. 106 pp. 1s. 6d. (From Mr. Menken.)

—45. Report of the Wheat Commission upon the administration of the Wheat Act, 1932, from June 1, 1932, to July 31, 1937. 1938. xi + 253 pp. 1s.

Index number of agricultural prices 1938. 1938. 42 pp. 9d.
[London : H.M.S.O., 9 $\frac{3}{4}$ " \times 6".]

Education, Board of—

Report of the Consultative Committee on Secondary Education, with special reference to grammar schools and technical high schools. 8 $\frac{1}{4}$ " \times 5 $\frac{1}{4}$ ". xxxviii + 477 pp. 3s. 6d.

Science Museum. Hand-list of short titles of current periodicals in the Science Library. Part I : alphabetical. 5th ed. 10 $\frac{1}{2}$ " \times 7". 262 pp. 9s.
[London : H.M.S.O., 1938.]

Foreign Office. Trade agreement between the United Kingdom and the United States of America . . . Washington, Nov. 17, 1938. London : H.M.S.O., 1938. Cd. 5882. 9 $\frac{3}{4}$ " \times 6". 118 pp. 1s. 6d.

General Register Office. The Registrar-General's decennial supplement, England and Wales 1931. Part IIa, Occupational mortality. London : H.M.S.O., 1938. 13 $\frac{1}{4}$ " \times 8 $\frac{1}{4}$ ". vii + 404 pp. 17s. 6d.

Health, Ministry of. A study of the trend of mortality rates in urban communities of England and Wales with special reference to "depressed areas," by E. Lewis Fanning. ii + 66 pp. Lead in food, by G. W. Monier-Williams. iv + 51 pp. London : H.M.S.O., 1938. 9 $\frac{3}{4}$ " \times 6". 1s. each.

Imperial Economic Committee—

Industrial fibres : a summary of figures of production, trade, and consumption relating to cotton, wool, mohair, silk, flax, jute, hemp and rayon. 113 pp.

Meat : a summary of figures of production and trade relating to beef, mutton and lamb, bacon and hams, pork, cattle, sheep, pigs, canned meat. 96 pp.

Plantation crops : a summary of figures of production and trade relating to sugar, tea, coffee, cocoa, spices, tobacco, and rubber. . . . 114 pp.
[London : H.M.S.O., 1938. 9 $\frac{3}{4}$ " \times 7 $\frac{1}{2}$ ". 2s. 6d. each.]

Local Taxation, Departmental Committee on. First report. Cd. 6304. 1912.

Appendix to first report, minutes of evidence. 2 vols. Cd. 6303.

Final report, England and Wales. Cd. 7315. 1914.

[London : H.M.S.O., 1912-14. 13 $\frac{1}{4}$ " \times 8 $\frac{1}{4}$ ". 4 vols. (From Mr. Menken).]

Overseas Trade, Department of—

Reports : 704. Dominican Republic and Hayti, March 1938. xii + 47 pp. 1s. 705. Argentine, April 1938. xvi + 196 pp. 3s. 6d. 706. Switzerland, May 1938. x + 75 pp. 1s. 3d. 707. Belgian Congo, May 1938. 54 pp. 1s. 708. Panama and Costa Rica (1936-37). 56 pp. 1s. 709. Yugoslavia, July 1938. 43 pp. 1s. 710. Syria and the Lebanon, 1936-38. 35 pp. 9d. 711. Philippine Islands, June 1938. 44 pp. 9d. 712. Poland, June 1938. 52 pp. 1s. 713. Canada (1937-38). 155 pp. 2s. 6d. 714. Greece, July 1938. 88 pp. 1s. 6d. 715. Portugal, August 1938. 88 pp. 1s. 6d. 716. Norway, September 1938. 123 pp. 2s. 717. British East Africa, July 1937-July 1938. 81 pp. 1s. 6d. 718. India, 1937-38. 290 pp. 4s. 6d. 719. Finland, August 1938. 90 pp. 1s. 6d.

[London : H.M.S.O., 1938-39. 9 $\frac{3}{4}$ " \times 6".]

(a) **United Kingdom—Contd.**

Royal Commission on Food Prices. Vol. I. First report. London: H.M.S.O., 1925. 9 $\frac{1}{4}$ " \times 6". 207 pp. 3s. 6d. (From Mr. Menken.)

Royal Commission on Indian Currency and Finance. Vol. I, Report. Cd. 2687. Vols. II–III, Appendices to the report. Vols. IV–V, minutes of evidence. Vol. VI, Index to the report. London: H.M.S.O., 1926. Vol. I, 9 $\frac{1}{4}$ " \times 6". Vols. II–VI, 13" \times 8".

Royal Commission on Local Government—

First report. Cd. 2506. 1927. 487 pp. 9s. Second report. Cd. 3213. 1928. 73 pp. 1s. 6d. Final report. Cd. 3436. 1929. 169 pp. 3s. 9 $\frac{1}{4}$ " \times 6".

Minutes of evidence . . . Parts I–XII. 1923–28. 13 $\frac{1}{4}$ " \times 8 $\frac{1}{4}$ ". 12 vols. [London: H.M.S.O. (From Mr. Menken.)]

Proofs of evidence submitted by the County Councils' Association. London: privately printed. 13 $\frac{1}{4}$ " \times 8 $\frac{1}{4}$ ". 133 fols. (From Mr. Menken.)

Royal Commission on Local Taxation—

First report. Cd. 9141. 1899. 62 pp.

Minutes of evidence. Vol. I. Cd. 8763. 1898. 513 pp. Vol. II. Cd. 9150. 1899. 352 pp. Vol. III. Scotland. Cd. 9319. 1899. 307 pp. Vol. IV. Cd. 201. 1900. 280 pp.

Appendices to minutes of evidence. Vol. I. Cd. 8764. Vol. II. Cd. 8765. 1898.

Final report, England and Wales. Cd. 638. 1901. 184 pp.

Appendices to final report, England and Wales. Cd. 1221. 1902. 225 pp.

Final report, Scotland. Cd. 1067. 1902. 111 pp.

Memoranda chiefly relating to the classification and incidence of imperial and local taxes. Cd. 9526. 1899. 250 pp.

[London: H.M.S.O., 13 $\frac{1}{4}$ " \times 8". (From Mr. Menken.)]

Royal Commission on London Government—

Report of the Commissioners appointed to inquire into the local government of Greater London. Cd. 1830. 1923. 207 pp. 6s. 6d. Minutes of evidence, Parts I–VII. Index to minutes of evidence. 1922–1924. 8 parts. 36s. London: H.M.S.O., 13 $\frac{1}{4}$ " \times 8 $\frac{1}{4}$ ". (From Mr. J. Menken.)

Royal Commission on National Health Insurance—

Report . . . 1926. xii + 394 pp. 9 $\frac{1}{4}$ " \times 6". 6s. 6d.

Minutes of evidence . . . 1925. 4 vols. 13 $\frac{1}{4}$ " \times 8 $\frac{1}{4}$ ". 43s. 6d.

Appendices to minutes of evidence . . . 1924–26. 13 $\frac{1}{4}$ " \times 8 $\frac{1}{4}$ ". Parts I–4. 40s. [London: H.M.S.O. (From Mr. Menken.)]

Royal Commission on the Poor Laws. Report . . . on the Poor Laws and Relief of Distress. London: H.M.S.O., 1909. 9 $\frac{1}{4}$ " \times 6". 3 vols. (From Mr. Menken.)

Trade, Board of—

Census of seamen, 15 June 1937 (vessels registered in the United Kingdom). 13 $\frac{1}{4}$ " \times 8". 16 pp. 1s.

Final report on the fifth census of production and the Import Duties Act inquiry 1935, Part I. The textile trades, the leather trades, the clothing trades. 9 $\frac{1}{4}$ " \times 6". xviii + 512 pp. 7s. 6d.

[London: H.M.S.O., 1938.]

(b) **British Empire.****Australia—**

Advisory Council on Nutrition. Final report, together with appendices. Canberra, 1938. 13 $\frac{1}{4}$ " \times 8". viii + 166 pp. (From Dr. Carr Fraser.)

Tasmania. State Finance Committee—

Employment and its seasonality in Tasmania . . . by H. J. Exley and Professor F. R. E. Mauldon. iii + 12 pp. + vii plates.

The Tasmanian economy in 1937–38 . . . by Professor F. R. E. Mauldon assisted by D. L. Anderson. 27 pp. [Hobart, 1938. 11" \times 8 $\frac{3}{4}$ ".]

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Industry and Commerce, Department of. Census of industrial production 1936. 10" \times 6 $\frac{1}{4}$ ". xxxviii + 194 pp. 2s. [Dublin, 1938.]

Union of South Africa—

Census and Statistics, Office of—

Sixth census of the population . . . 5th May 1936. Vol. I. Population. Sex and geographical distribution of the population. xlii + 107 pp. + 18 maps. Vol. II. Ages of the European, Asiatic, and coloured population. xxix + 203 pp. 7s. 6d. each.

Report on the statistics of crime for the years 1936 and 1937. 42 pp. 3s. [Pretoria, 1938. 12" \times 9 $\frac{3}{4}$ ".]

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Comisión Nacional del Censo Industrial. Censo industrial de 1935. 10 $\frac{3}{4}$ " \times 8 $\frac{1}{4}$ ". xliii + 750 pp. (From the Dirección General de Estadística.)

Buenos Aires. Municipalidad de la Ciudad. Cuarto censo general 1936. Población 22-x-1936. Tomo 1. Informe preliminar. 12" \times 9". xii + 430 pp. [Buenos Aires, 1938.]

Belgium—

Office Central de Statistique—

Population, recensement général au 31 décembre 1930. Tomes IV, V, VI. Brussels 1937. 3 vols. 12 $\frac{1}{2}$ " \times 9 $\frac{1}{2}$ ".

Recensement économique et social au 27 février 1937. Recensement des établissements industriels et commerciaux. Provinces de Limbourg, Luxembourg, Namur. Brussels. 1938. 3 parts. 12 $\frac{1}{4}$ " \times 8 $\frac{1}{2}$ ".

Brazil—

Instituto Nacional de Estatística—

Anuario estatístico do Brasil. Ano II. 1936. x + 435 pp. Ano III. 1937. v + 889 pp.

Sinopse estatística do estado N. 2. Separata, com acrescimos, do anuario estatístico do Brasil ano III, 1937. Alagoas. 174 pp. Amazonas. 130 pp. Baía. 222 pp. Ceara. 165 pp. Espirito Santo. 180 pp. Goiaz. 164 pp. Maranhão. 178 pp. Mato-Grosso. 157 pp. Minas Gerais. 204 pp. Para. 180 pp. Paraíba. 160 pp. Parana. 163 pp. Pernambuco. 184 pp. Piaui. 207 pp. Rio de Janeiro. 202 pp. Rio Grande do Norte. 156 pp. Rio Grande do Sul. 202 pp. São Paulo. 230 pp. Santa Catarina. 156 pp. Sergipe. 154 pp. 20 vols.

Sinopse estatística do territorio N. 2. Territorio do Acre. 116 pp.

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[Rio de Janeiro, 1937-38. 10 $\frac{1}{2}$ " \times 7 $\frac{1}{4}$ ".]

(c) Foreign Countries—Contd.

Czechoslovakia—

Office de Statistique—

La statistique tchécoslovaque. Vol. 126. Recensement de la population . . . 1930. Tome IV. Partie I. Nombre des infants nés vivants du dernier mariage. 1936. x + 222 pp.

Recensement des établissements industriels dans la République Tchécoslovaque d'après l'état au 27 mai 1930. Tome I. Principales données concernant les unités locales par districts. 1935. xxvi + 61 + 215 pp. 65 Kč.

Prix de détail des articles de première nécessité, nombres-indices du coût de la vie et nombres-indices des denrées alimentaires en 1921-1936. 1938. 47 + 436 pp. [Prague. 12½" × 9¼".]

Germany—

Statistisches Reichsamt. Statistik des deutschen Reichs—

Bände: 490. Die Viehwirtschaft 1935-36. Teil II. Tierische Erzeugnisse. 434 pp. 515. Bodenbenutzung und Ernte 1937. 519. Die Hauptveranlagung der Vermögensteuer nach dem Stand vom 1 Januar 1935. 211 pp. 525. Abschlüsse deutscher Aktiengesellschaften 1935-6 und 1936-7. 106 pp.

Hungary—

Office Central Royal Hongrois de Statistique. Publications statistiques hongroises, 105. Principales données d'exploitation de l'agriculture de Hongrie en 1935 . . . Budapest, 1938. 10½" × 7½". 16 + 529 pp.

Italy—

Ispettorato per la Difesa del Risparmio e per l'Esercizio del Credito. Bollettino . . . N. 26, agosto 1938. N. 27, settembre 1938. Rome, 1938. 2 parts. 10½" × 7¼".

Luxemburg—

Office de Statistique—

Résultats du recensement de la population du 31 décembre 1935. Tome I. 9½" × 6¼". 116 pp.

Statistique des facultés imposées en 1937 dressée par la Direction des Contributions Luxembourg. Octobre 1938. 11½" × 9". 156 pp. [Luxembourg, 1938.]

Norway—

Det Statistiske Centralbyrå. Norges offisielle statistikk IX. 146. Arbeidssvilkårene for hushjelp i norske byer. Oslo, 1938. 9½" × 6¼". 8 + 119 pp.

Poland—

Office Central de Statistique. Deuxième recensement général de la population . . . 1931. Logements et ménages. Population. Professions. Voievodie de Kraków non compris la ville de Kraków. xxix + 437 pp. Logements et ménages. Population. Pologne. xiv + 73 pp. Professions. Population dans l'agriculture. Pologne. xvi + 17 pp. [Warsaw, 1938. 11½" × 8".]

Spain—

Ministerio de Agricultura. Subsecretaria. Sección de Estadística, Economía y Política Agraria. Estadística de la producción de las raíces tubérculos y bulbos y de las plantas horticolas 1937. Barcelona, 1938. 9½" × 6¼". 72 pp.

(c) Foreign Countries—Contd.

Sweden—

Ecklesiastikdepartementet. Utredning rörande de Svenska universitets-och högskolestudenternas sociala och ekonomiska förhållanden. Utarbetad av *Sven Wicksell* och *Tage Larsson*. Bilaga till betänkande med undersökningar och förslag i anledning av tillströmningen till de intellektuella yrkena. Stockholm, 1936. 9½" × 6½". 381 pp.

Kommerskollegium. Relevé des importations et des exportations de la Suède en 1936 selon la nomenclature statistique des marchandises acceptée par le Conseil de la Société des Nations (la liste minimum). Stockholm, 1937. 9" × 6". 32 pp.

K. Socialstyrelsen. Undersökning rörande Löneläget och Lönevariationerna inom jordbruket 1935-1936. Stockholm, 1938. 9½" × 6½". 172 pp.

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Pälsdjursräkningen den 15 september 1937. 44 pp.

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[Stockholm, 1938. 9½" × 6½".]

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Bureau Fédéral de Statistique—

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Recensement fédéral du bétail . . . 1936. 11½" × 8½". vii + 92 + 249 pp. [Bern, 1938.]

Turkey—

Office Central de Statistique. Recensement general de la population . . . 1935. Population de la Turquie : résultats définitifs. Ankara, 1937. 11½" × 8½". xxviii + 404 pp.

United States—

Marketing and distribution. Report of the Joint Commission of Agricultural Inquiry, Part IV. 266 pp. 1922. (From Mr. Menken.)

Foreign and Domestic Commerce, Bureau of. Domestic commerce series :

1. Commercial survey of the Philadelphia marketing area. By J. F. Dewhurst. 1925. 130 pp. 6. Market research agencies . . . 1927 edition. 1927. 156 pp.

United States Coal Commission. Report. Parts : 1. Principal findings and recommendations. II. Anthracite, detailed studies. IV. Bituminous coal, detailed studies. V. Atlas of statistical tables. 1925. (From Mr. Menken.) [Washington, 9" × 6".]

Yugoslavia—

Statistique Générale d'Etat. Résultats définitifs du recensement de la population . . . 1931. Livre III. Population de fait par le degré d'instruction et l'âge. Beograd, 1938. 11" × 8½". vii + 133 pp.

(d) International.

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N. 22. Industrial accident statistics. 129 pp. 4s.

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[Geneva (London : P. S. King), 1938. 9½" × 6½".]

(d) **International**—*Contd.***League of Nations—***Economic and Financial Section—*

Economic Committee. Preliminary investigation into measures of a national or international character for raising the standard of living.

Memorandum . . . by *N. F. Hall*. 1938. $9\frac{1}{2}'' \times 6\frac{1}{2}''$. 91 pp. 2s.

International trade statistics 1937. 1939. $10\frac{3}{4}'' \times 8\frac{1}{2}''$. 450 pp. (From Sir Alfred Flux.)

Report on systems of agricultural credit and insurance submitted by *M. Louis Tardy* . . . 1938. $9\frac{3}{4}'' \times 6\frac{1}{2}''$. viii + 116 pp.

[Geneva (London: Allen and Unwin), 1938.]

Studies and reports on statistical methods [prepared by the Committee of Statistical Experts]: 1. Statistics of the gainfully-occupied population, definitions and classifications recommended by the Committee . . . 32 pp. 1s. 2. Minimum list of commodities for international trade statistics. Revised ed. . . . 62 pp. 2s. 3. Timber statistics: a minimum programme . . . 17 pp. 9d. 4. Statistics relating to capital formation: a note on methods. 22 pp. 1s. Geneva, 1938. $10\frac{3}{4}'' \times 8\frac{1}{2}''$.

Survey of national nutrition policies 1937-38. Geneva (London: Allen and Unwin), 1938. $9\frac{1}{2}'' \times 6\frac{1}{2}''$. 120 pp.

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 [Paris: Hermann, 1937–38. 10" × 6½".]
Andersson (Montgomery D.). Dynamic theory of wealth distribution. Gainesville: University of Florida Press, 1938. 9" × 6". xi + 243 pp.
Astbury (S. J.). Petroleum statistics. Reprint from *Annual Review of Petroleum Technology*, Vol. 3. 1937. Pp. 457–472. 9" × 6". (From the author.)
Bartlett (M. S.). The approximate recovery of information from replicated field experiments with large blocks. Cambridge: reprint from *Journal of Agricultural Science*, 1938. Pp. 418–427. (From the author.)
Bates (W. D.). Elementary mathematical statistics. New York: John Wiley (London: Chapman and Hall), 1938. 8½" × 5½". x + 338 pp. 15s.
Bellman (Sir Harold). Capital, confidence and the community. Cambridge: Heffer, 1938. 7¼" × 4½". xi + 198 pp. 3s. 6d.
Benham (Frederic). Economics: a general textbook for students. London: Pitman, 1938. 8½" × 5½". xv + 488 pp. 7s. 6d.
Bernouille (L. D. de). Initiation à l'analyse statistique. Paris: Librairie Générale de Droit et de Jurisprudence, 1939. 9" × 6". 232 pp. (From the author.)
Blackett (O. W.) and Wilson (W. P.). A method of isolating sinusoidal components in economic time series. Ann Arbor: University of Michigan, 1938. 9" × 6". 58 pp. \$1. (From the School of Business Administration.)
Bowley (A. L.) and Stamp (Lord) of Shortlands. Three studies on the national income, being The division of the product of industry, by *Arthur L. Bowley*. . . . The change in the distribution of the national income, 1880–1913, by *Arthur L. Bowley*. . . . The national income, 1924, by *Arthur L. Bowley and Sir Josiah Stamp*. . . . London: reprinted by the London School of Economics, 1938. 8½" × 5½". 4 + 60 + 27 + 59 pp. 6s.
Braithwaite (Constance). The voluntary citizen: an enquiry into the place of philanthropy in the community. London: Methuen, 1938. 7¼" × 4¾". xix + 342 pp. 7s. 6d.
British Association. Britain in recovery: prepared by a research committee of the Economic Science and Statistics Section of the British Association. London: Pitman, 1938. 8¼" × 5½". xvi + 474 pp. 15s.
Broster (E. J.). Cost, demand and net revenue analysis. London: Gee and Co., 1938. 8½" × 5½". 83 pp. 3s. 6d.
Burchett (Floyd F.). Investments and investment policy. New York and London: Longmans, 1938. 8½" × 5½". 821 pp. 18s.
Buros (O. K.). [Editor]. Research and statistical methodology: books and reviews 1933–1938. New Brunswick: Rutgers University Press, 1938. 9¼" × 6". vii + 100 pp. \$1.25.
Clark (Colin) and Crawford (J. G.). The national income of Australia. Sydney and London: Angus and Robertson, 1938. 7" × 4¾". viii + 120 pp. 3s. 6d.
Clark (G. N.). Guide to English commercial statistics 1696–1782 . . . with a catalogue of materials by *Barbara M. Franks*. London: Royal Historical Society, 1938. 9" × 5¾". xvi + 211 pp. 7s. 6d.
Congrès International de la Population, Paris 1937. 1. Théorie générale de la population. 270 pp. II. Démographie historique. 105 pp. III. Démographie statistique: études d'ensemble. 155 pp. VI. Démographie de la France d'outremer. 128 pp. Paris: Hermann, 1938. 10" × 6½". 4 vols.

II.—Authors and Miscellaneous—Contd.

- Connor (L. R.)*. Statistics in theory and practice. 3rd. ed. London: Pitman, 1938. 8½" × 5½". xiv + 383 pp. 12s. 6d.
- Crawford (Sir William) and Broadley (H.)*. The people's food. London: Heinemann, 1938. 9" × 5½". xiii + 336 pp. 12s. 6d.
- Crowther (F.) and Bartlett (M. S.)*. Experimental and statistical technique of some complex cotton experiments in Egypt. Reprint from *Empire Journal of Experimental Agriculture*, 1938. Pp. 53-68. 9½" × 6½". (From the authors.)
- Crum (W. L.), Patton (A. C.) and Tebbutt (A. R.)*. Introduction to economic statistics. New York and London: McGraw-Hill, 1938. 9" × 6". xi + 423 pp. 24s.
- David (F. N.) and Neyman (J.)*. Extension of the Markoff theorem on least squares. London: reprint from *Statistical Research Memoirs*, 1938. Pp. 105-116. 10½" × 7½". (From the authors.)
- Deutscher Verein für Versicherungs-Wissenschaft*. Veröffentlichungen, Heft 62. Seeversicherungsrecht, von *Otto Hagen*. Berlin: Mittler, 1938. 9½" × 6½". vii + 175 pp.
- Drummond (J. M.) and Marshall (A. H.)*. Consolidated loans funds of local authorities. London, etc.: William Hodge, 1938. 8½" × 5½". 169 pp. 7s. 6d.
- Eden (Sir Frederick Morton)*. An estimate of the number of inhabitants in Great Britain and Ireland. . . . London: printed for J. Wright, 1800. 9" × 5½". 4 + 93 pp. (From Mr. Yule.)
- Fay (C. R.)*. Co-operation at home and abroad: a description and analysis. Vol. II, 1908-1938. London: P. S. King, 1939. 8½" × 5½". x + 540 pp. 18s.
- Fisher (R. A.)*. On the statistical treatment of the relation between sea-level characteristics and high-altitude acclimatization. London: reprint from *Proceedings of the Royal Society, Series B*, Vol. 126, 1938. Pp. 25-29. 10" × 6½". (From the author.)
- Statistical methods for research workers. 7th ed. Edinburgh and London: Oliver and Boyd, 1938. 8½" × 5½". xv + 356 pp. 15s.
- The statistical utilization of multiple measurements. London: reprint from *Annals of Eugenics*, 1938. Pp. 376-386. 11" × 8". (From the author.)
- and *Yates (F.)*. Statistical tables for biological, agricultural and medical research. London and Edinburgh: Oliver and Boyd, 1938. 11½" × 8½". viii + 90 pp. 12s. 6d.
- Frankel (S. H.)*. Capital investment in Africa, its course and effects. . . . Issued by the Committee of the African Research Survey under the auspices of the Royal Institute for International Affairs. London: Oxford University Press, 1938. 8½" × 5½". xvi + 487 pp. + 6 charts + 2 maps. 10s. 6d.
- Franz (Josef)*. Heiratsalter und Beruf: eine bevölkerungstatistische Studie. Berlin: R. Schoetz, 1938. 9½" × 6½". 162 pp.
- Fraser (L. M.)*. Economic thought and language: a critique of some fundamental economic concepts. London: Black, 1937. 8½" × 5½". xx + 411 pp. 12s. 6d.
- Free trade and protection. [A collection of documents mainly on tariffs, free trade and protection. Empire free trade: including Board of Trade reports on safeguarding of industries 1925-28 and reports under the Merchandise Marks Act 1926.] 77 items. (From Mr. Menken.)
- Ganguli (Birendranath)*. Trends of agriculture and population in the Ganges valley: a study in agricultural economics. London: Methuen, 1938. 8½" × 5½". xviii + 315 pp. 18s.
- Hansen (A. H.)*. Full recovery or stagnation? London: Black, 1938. 8½" × 5½". 350 pp. 15s.
- Hanson (S. G.)*. Argentine meat and the British market: chapters in the history of the Argentine meat industry. California: Stanford University Press (London: H. Milford), 1938. 9" × 6". vii + 294 pp. 16s.

II.—Authors and Miscellaneous—Contd.

Harvard University. Graduate School of Business Administration. Bureau of Business Research. Bulletins: 106. Operating results of department and speciality stores in 1937. By *C. M. Schmalz*. 34 pp. 107. Expenses and profits of limited variety chains in 1937. By *S. F. Teele*. 33 pp.

— Business research studies: 20. The co-operative banks of Massachusetts. By *D. H. Davenport*. 53 pp. 21. The risk of unemployment and its effect on unemployment compensation. By *J. W. Horwitz*.

[Boston, Mass.: The Bureau, 1938. 11" × 8½". (From Mr. Menken.)
Hawtrey (R. G.). A century of bank rate. London: Longmans, 1938. 8½" × 5½". x + 328 pp. 10s. 6d.

Hicks (U. K.). The finance of British government 1920-1936. London: Oxford University Press, 1938. 8½" × 5½". xii + 391 pp. 15s.

Hutchison (T. W.). The significance and basic postulates of economic theory. London: Macmillan, 1938. 8½" × 5½". x + 192 pp. 8s. 6d.

Hygiene and Tropical Diseases, Bureau of. Tropical diseases bulletin. Vol. 35, 1938. Supplement, November, 1938. Medical and sanitary reports from British colonies, protectorates and dependencies for the year 1936. Summarized by *P. Granville Edge*. London: Bureau of Hygiene . . . 1938. 9½" × 6". 296 pp. 7s. 6d. (From Major Edge.)

Institut für Konjunkturforschung. Schriften. Sonderhefte: 45. Der künftige Wohnungs- und Siedlungsbau Grundlagen einer volkswirtschaftlichen Planung. Von *Dr. Walter Fey*. 64 pp. *Rm.* 4.80. 46. Die Flugzeugindustrie der anderen Weltkriegserfahrungen. Gegenwärtiger Stand wirtschaftliche Mobilmachung. Von *Dr. Rolf Wagerführ*. 225 pp. *Rm.* 9.80. Berlin: Hanseatische Verlagsanstalt Hamburg, 1939. 9" × 6".

Iron and steel. [A collection of reports mainly official, on the iron and steel trades in the United Kingdom and United States.] 12 items. (From Mr. Menken.)

Jenks (L. H.). The migration of British capital to 1875. London: Jonathan Cape, 1938. 7½" × 5½". 3 + 442 pp. 15s.

Julin (Armand). Luigi Bodio et Adolphe Quetelet: extraits de leur correspondance (1868-1874). The Hague: reprint from *Revue de l'Institut International de Statistique*, 1938. 46 pp. (From the author.)

King (Constance M. and Harold). "The two nations": the life and work of Liverpool University Settlement and its associated institutions 1906-1937. Liverpool: University Press (London: Hodder and Stoughton), 1938. 8½" × 5½". xvii + 238 pp. 7s. 6d.

Kirsh (B. S.) and Shapiro (H. R.). Trade associations in law and business. New York: Central Book Co. 1938. 9" × 6". 399 pp.

Kuznets (S.). Commodity flow and capital formation. Vol. 1. New York: National Bureau of Economic Research (London: Macmillan), 1938. 11½" × 8½". ix + 505 pp. 21s.

Layton (Sir Walter T.) and Crowther (Geoffrey). An introduction to the study of prices. 3rd. ed. London: Macmillan, 1938. 7½" × 4¾". xiv + 288 pp. + 2 folded charts. 8s. 6d.

Linfield (H. S.). State population census by faiths: meaning, reliability and value. New York: Hasid's Bibliographic and Library service, 1938. 9" × 6". 72 pp. \$2.

Lloyd (David). Evaporation over catchment areas. [An application of correlation analysis with one dependent and four independent variables]. London: reprint from *Royal Meteorological Society, Quarterly Journal*, 1938, pp. 423-444. 9½" × 6". (From the author.)

Local government. [A collection of documents, mainly official reports on local government acts, poor relief, maternal mortality, derating and rating reform, police, lunacy and mental deficiency.] 36 items. (From Mr. Menken.)

London. [A collection of L.C.C., British official, and other documents mainly relating to London government and transport.] 26 items. (From Mr. Menken.)

II.—Authors and Miscellaneous—Contd.

- London, University of. University College. Department of Statistics. Tracts for computers. No. XXIII. Tables of $\tan^{-1}x$ and $\log(1+x^2)$ to assist in the calculation of the ordinates of a Pearson type IV curve. By L. J. Comrie. Cambridge: University Press, 1938. $11\frac{1}{2}'' \times 8\frac{1}{2}''$. 18 pp. 3s. 9d.
- London and Cambridge Economic Service. Special memoranda: 46. Statistics of monetary circulation in England and Wales 1919-37. By E. H. Phelps Brown and G. L. S. Shackle. 42 pp. 47. Output employment and wages in the United Kingdom, 1924, 1930, 1935. By G. L. Schwartz and E. C. Rhodes, with an introduction by Professor A. L. Bowley. 36 pp. London, 1938. $10\frac{3}{4}'' \times 8\frac{1}{2}''$. 5s. each.
- Longfield (Mountfort). Three lectures on commerce and one on absenteeism. . . . London: reprinted by the London School of Economics, 1938. $8\frac{1}{2}'' \times 5\frac{1}{2}''$. 4 + 111 pp. 6s.
- McCulloch (J. R.). The literature of political economy: a classified catalogue of select publications in the different departments of that science, with historical, critical, and biographical notices. London: reprinted by the London School of Economics, 1938. $8\frac{1}{2}'' \times 5\frac{1}{2}''$. xiii + 1 + 407 pp. 12s. 6d.
- McGregor (A. Grant). Right wages: the index which determines the wages best for both capital and labour: the reforms required in wage, banking, and exchange practices. London: Pitman, 1938. $8\frac{1}{2}'' \times 5\frac{1}{2}''$. xi + 316 pp. 8s. 6d.
- Madsen (A. W.). Why rents and rates are high: land monopoly in town and country—600 examples. London: United Committee for the Taxation of Land Values, 1938. $6\frac{3}{4}'' \times 4\frac{1}{4}''$. xx + 229 pp. 1s.
- Matolcsy (Matthias) and Varga (Stephen). The national income of Hungary 1924-25 to 1936-37. London: P. S. King, 1938. $11\frac{3}{4}'' \times 8\frac{1}{4}''$. vii + 116 pp. 15s.
- Myers (C. S.) and others. A discussion on the application of quantitative methods to certain problems in psychology. . . . London: reprint from *Royal Society, Proceedings*, Series B, No. 841, 1938. Pp. 415-434. $10'' \times 7''$. (From Professor Greenwood.)
- National Committee to Promote the Break-up of the Poor Law. The minority report of the Poor Law Commission. Part I. The break-up of the poor law. Part II. The unemployed. London: National Committee. . . . 1909. $8\frac{3}{4}'' \times 5\frac{3}{4}''$. 2 vols. (From Mr. Menken.)
- National Distribution Conference, Washington. Report of Committee: I. Collection of business figures. 42 pp. II. Trade relations. 93 pp. III. Market analysis. 44 pp. IV. Expenses of doing business. 113 pp. V. Methods of distribution. 37 pp. VI. General conditions affecting distribution. 41 pp. Washington: held under the auspices of the Chamber of Commerce of the United States. $9'' \times 6''$. 6 parts. (From Mr. Menken.)
- Neyman (J.). A historical note on Karl Pearson's deduction of the moments of the binomial. London: reprint from *Biometrika*, 1938. Pp. 11-15. $10\frac{3}{4}'' \times 7\frac{3}{4}''$.
- "La critique est la vie de la science." London: reprint from *Nature*, 1938. 2 pp. $11'' \times 8\frac{1}{2}''$.
- Tests of statistical hypotheses which are unbiased in the limit. Reprint from *Annals of Mathematical Statistics*, 1938. Pp. 69-86. $10'' \times 7''$. (From the Author.)
- Nixon (J. W.). On the statistics available concerning the occupied population of the world and its distribution. The Hague: reprint from *Revue de l'Institut International de Statistique*, 1938. 17 pp. $10\frac{1}{2}'' \times 7''$. (From the author.)
- Orr (John Boyd). Food, health and income: report on a survey of adequacy of diet in relation to income. 2nd ed. London: Macmillan, 1937. 83 pp. 2s. 6d.
- Oxford economic papers. No. 1, October, 1938. Oxford: Clarendon Press, 1938. $9\frac{1}{2}'' \times 6\frac{1}{2}''$. 123 pp. 3s. 6d.
- Pearl (Raymond). The natural history of population. University of London Heath Clark lectures, 1937. . . . London: Oxford University Press, 1938. $8\frac{1}{2}'' \times 5\frac{1}{2}''$. xii + 416 pp.

II.—Authors and Miscellaneous—Contd.

- Pearson (E. S.)*. Karl Pearson : an appreciation of some aspects of his life and work. Cambridge : University Press, 1938. $10\frac{1}{2}'' \times 7\frac{1}{2}''$. viii + 170 pp. 10s. 6d.
- Pirou (Gaëtan)*. L'utilité marginale de C. Menger à J. B. Clark : conférences faites à l'École Pratique des Hautes Études en 1931-1932. 2nd ed. Paris : Domat-Montchrestien, 1938. $9'' \times 5\frac{1}{4}''$. 323 pp. 85f.
- Plummer (Alfred)*. International combines in modern industry. 2nd ed. London : Pitman, 1938. $8\frac{1}{4}'' \times 5\frac{1}{4}''$. ix + 302 pp. 10s. 6d.
- Posadowsky-Wehner (Harald, Graf von)*. Das Bevölkerungsproblem in Frankreich. . . 6. Beiheft zum Archiv für Bevölkerungswissenschaft und Bevölkerungspolitik. Leipzig : Herzel, 1939. $9\frac{1}{2}'' \times 6\frac{3}{4}''$. x + 134 pp. 7 Rm.
- Punjab Board of Economic Inquiry. Pamphlet No. 2. Agricultural statistics of the (British) Punjab 1936-37. . . iv + 14 pp. 4 as.
- Publications : 58. Farm accounts in the Punjab 1935-36. . . xx + 294 pp. Rs. 1/8. 59. Family budgets, 1935-36, of six tenant-cultivators in the Lyallpur District. . . viii + 38 pp. 6 as. 60. Urban working-class cost-of-living index numbers (1937) in the Punjab. . . 19 pp. + 5 graphs. 8 as. [Lahore : C and M. Gazette, 1938.]
- Quensel (Carl-Erik)*. A method of determining the regression curve when the marginal distribution is of the normal logarithmic type. Reprint from *Annals of Mathematical Statistics*, Vol. VII, No. 4. pp. 196-201. 1938. $10'' \times 7''$.
- The distribution of the second moment and of the correlation coefficient in samples from populations of type A. Lunds Universitets Arsskrift, Nr. 4, 1938. $10\frac{1}{4}'' \times 7\frac{1}{4}''$. 111 pp.
- Ross (J. A.)*. Speculations, stock prices and industrial fluctuations : a study of the effects of stock speculation on stock price movements and the influence of these movements on production and business. New York : Ronald Press, 1938. $8'' \times 5\frac{1}{4}''$. xvi + 426 pp. \$4.50.
- Rowntree (B. Seebohm)*. The human factor in business : further experiments in industrial democracy. London : Longmans, 1938. $7\frac{1}{4}'' \times 4\frac{3}{4}''$. xx + 244 pp. 4s.
- Schultz (Henry)*. The theory and measurement of demand. Chicago : University Press (Cambridge : University Press), 1938. $9\frac{3}{4}'' \times 6\frac{1}{2}''$. xxxi + 817 pp. 34s.
- Secrist (Horace)*. National bank failures and non-failures : an autopsy and diagnosis. Bloomington, Indiana : Principia Press, 1938. $9\frac{3}{4}'' \times 6\frac{1}{2}''$. xix + 309 pp.
- Sering (M.)*. International price movements and the condition of agriculture in non-tropical countries. Berlin : Reichsdruckerei, 1927. $10\frac{1}{2}'' \times 8\frac{1}{4}''$. xv + 134 pp. + 9 folded maps, etc. (From Mr. Menken.)
- Seyd (R. E.)*. Some statistics of capital engaged in the Lancashire cotton trade and comments. . . London, 1938. $9'' \times 5\frac{1}{2}''$. 8 pp. (From the author.)
- Société de Statistique de Paris, Journal. . . Table alphabétique et analytique des matières contenues dans la collection du Journal du 1er janvier 1911 au 31 décembre 1935 (Tomes LII à XLVI) et liste alphabétique des auteurs avec l'indication de leurs travaux, par A. Barriol. Paris : Berger-Levrault, 1938. $11' \times 7\frac{1}{2}''$. 91 pp.
- Spengler (J. J.)*. France faces depopulation. Durham, N. Carolina : Duke University Press, 1938. $9'' \times 6''$. xi + 313 pp. \$3.
- Staples (Ronald)*. "Taxation" manual, compiled by barristers and experts under the direction of Ronald Staples. London : Taxation Publishing Co., and Pitman, 1938. $8\frac{1}{4}'' \times 5\frac{1}{4}''$. xvi + 328 pp. 10s. 6d.
- Stockman (Sven K.)*. Transithandeln vid import till Sverige med sätorskild häsyn till år 1935. Stockholm : Nordiska Bokhandeln i Distribution, 1938. $9\frac{3}{4}'' \times 7\frac{1}{2}''$. 150 + 271 pp. 15 kr. (From Sir A. W. Flux.)
- Sukhatme (P. V.)*. On bipartitional functions. London : reprint from *Royal Society Philosophical Transactions*, Series A., Vol. 237. Pp. 375-409. 1938. $12'' \times 9''$.

II.—Authors and Miscellaneous—Contd.

- Thomas (Edgar) and Elms (C. E.).* An economic survey of Buckinghamshire agriculture, Part I. Farms and estates. Reading: the University, 1938. 9 $\frac{3}{4}$ " \times 6". viii + 45 pp. (From Mr. Thomas.)
- Thomas (Richard M.).* Poverty and population: a factual study of contemporary social waste. London: Macmillan, 1938. 7 $\frac{1}{4}$ " \times 5 $\frac{1}{4}$ ". xxviii + 320 pp. 10s. 6d.
- Trusts and Combines, Rationalization.* [A collection of documents, mainly reports of committees appointed under the Profiteering Acts 1919 and 1920, together with press cuttings and other material on related subjects.] 66 items. (From Mr. Menken.)
- Unemployment.* [A collection of reports, mainly by the Ministry of Labour and the International Labour Office, on unemployment, together with 5 reports of the Ministry of Transport on travelling facilities in the London area.] 31 items. (From Mr. Menken.)
- Unemployment insurance.* [A collection of reports, mainly by the Ministry of Labour.] 19 items. (From Mr. Menken.)
- Vielth-Knudsen (K. A.).* Natalité et progrès: synthèse économique, démographique et biologique sur la base des expériences de la France, de l'Allemagne et du Danemark. Paris: Recueil Sirey, 1938. 10" \times 6 $\frac{1}{2}$ ". xv + 327 pp. 80f.
- Villson (W. H.).* Empire trade: a concise handbook to the markets of the British Empire. London: P. S. King, 1938. 8 $\frac{1}{4}$ " \times 5 $\frac{1}{2}$ ". xiv + 296 pp. 10s. 6d. (From the author.)
- Winkler (Wilhelm).* Deutschland in aller Welt. Bevölkerungsstatistische Tabellen. Leipzig and Vienna: Franz Deuticke, 1938. 9" \times 6". 160 pp. 3 Rm.
- Wold (Herman).* A study in the analysis of stationary time series. Uppsala: Almqvist und Wiksells Boktryckeri, 1938. 9 $\frac{1}{2}$ " \times 6 $\frac{1}{2}$ ". viii + 214 pp. Kr. 6.
- Woytinsky (W. S.).* Labor in the United States: basic statistics for social security . . . a report prepared for the Committee on Social Security. Washington: the Committee . . . 1938. 9" \times 6". xxii + 333 pp. \$3.50.

REVENUE OF THE UNITED KINGDOM

*Net Produce in Quarters of 1938, and in Financial Years ended
March 31, 1937-38, 1936-37, 1935-36, 1934-35*

(000's omitted.)

QUARTERS, end	March 31, 1938	June 30, 1938	Sept. 30, 1938	Dec. 31, 1938	Total for calendar year 1938
	£	£	£	£	£
Customs	53,596	53,718	57,929	57,982	223,225
Excise	25,300	26,900	28,700	32,600	113,500
Stamps and Estate etc. Duties	28,710	23,630	23,760	24,720	100,820
Other Inland Revenue Duties	1,200	110	480	190	1,980
Postal Service	22,500	20,800	20,950	24,300	88,550
Telegraph Service					
Telephone Service					
National Defence Contribution	1,361	1,690	5,130	6,450	14,631
	132,667	126,848	136,949	146,242	542,706
Income Tax and Super Tax	254,231	17,739	46,025	48,530	366,525
	386,898	144,587	182,974	194,772	909,231
Motor Vehicles Duties	23,001	4,580	3,924	3,065	34,570
Crown Lands	300	280	350	390	1,320
Interest on Sundry Loans	943	365	3,561	866	5,735
Miscellaneous Receipts	3,405	1,255	2,148	5,979	12,787
	414,547	151,067	192,957	205,072	963,643

YEARS, end March 31,	1937-38	1936-37	1937-38 (compared with 1936-37)		Corresponding years	
			Increase	Decrease	1935-36	1934-35
	£	£	£	£	£	£
Customs	221,561	211,282	10,279	—	196,642	185,096
Excise	113,700	109,500	4,200	—	106,700	104,600
Stamps and Estate etc. Duties	113,150	117,130	—	3,980	113,720	105,466
Land Tax and Mineral Rights Duty	—	730	—	730	785	770
Other Inland Revenues	1,730	—	1,730	—	—	—
Postal Service	87,375	82,950	4,425	—	77,750	74,000
Telegraph Service						
Telephone Service						
National Defence Contribution	1,420	—	1,420	—	—	—
	538,936	521,592	22,054	4,710	495,597	469,932
Income Tax and Super Tax	355,046	310,777	44,269	—	289,094	280,042
	893,982	832,369	66,323	4,710	784,691	749,974
Excess Profits Duties	—	1,000	—	1,000	1,300	2,300
Corporation Profits Tax						
Motor Vehicle Duties	34,608	32,727	1,881	—	30,752	31,538
Crown Lands	1,330	1,350	—	20	1,360	1,320
Interest on Sundry Loans	5,230	4,550	680	—	4,934	4,372
Miscellaneous receipts	13,510	24,600	—	11,091	21,738	15,125
Total	948,660	896,596	68,884	16,821	844,775	804,629
			NET INCR. 52,063			

TRADE OF THE UNITED KINGDOM
for the years 1936-37-38
(from the Monthly Trade Returns, December, 1938)

Values (c.i.f.) of Imports*

	Year ended December 31,			Increase or Decrease 1938-1937	Increase or Decrease 1938-1936
	1936	1937	1938		
I. FOOD, DRINK AND TOBACCO—					
A. Grain and flour	69,556,116	91,267,180	74,424,670	+	6,898,326
B. Feeding-stuff for animals	8,458,316	11,937,711	11,422,013	+	3,064,278
C. Animals, living, for food	1,317,710	1,422,454	74,013	+	1,348,447
D. Meat	87,568,849	87,568,849	96,656,481	+	9,087,632
E. Dairy produce	67,303,102	72,904,914	70,984,024	+	3,681,912
F. Fish, fresh, and vegetables	2,225,004	2,225,004	2,225,004	+	1,967,460
G. Beverages and cocoa, pre-	44,671,680	48,363,017	46,821,099	+	1,904,947
H. Medicinal preparations	60,776,698	57,317,928	57,317,928	+	6,321,330
I. Tobacco	18,489,269	18,007,377	23,434,359	+	5,336,992
Total, Class I	381,567,077	431,990,688	431,377,880	+	49,810,805
II. RAW MATERIALS AND ARTICLES—					
A. Textile manufactures	32,110	23,790	14,730	-	17,380
B. Other non-metallic mineral products	4,304,259	5,260,523	4,721,625	+	538,898
C. Iron ore and scrap	8,358,074	12,657,207	10,751,707	+	2,396,633
D. Non-ferrous metals	12,270,146	10,445,114	16,216,522	+	3,949,376
E. Wood and timber	45,516,270	61,722,285	57,222,285	+	6,495,995
F. Rubber	15,516,270	15,516,270	15,516,270	+	15,516,270
G. Wool, raw and waste, and	45,655,349	52,130,314	42,695,710	-	2,962,239
H. Silk, raw and waste, and	1,824,044	2,263,137	2,058,301	+	233,747
I. Other textile materials	11,257,026	12,298,129	11,776,601	+	539,278
J. Paper-making materials	28,692,562	35,214,712	30,441,495	+	4,603,267
K. Hides and skins, unprepared	11,859,231	12,543,211	16,455,474	+	4,596,243
L. Rubber	4,302,188	11,013,118	734,808	+	7,281,210
M. Miscellaneous raw materials and articles, mainly un-	10,501,780	12,142,972	10,460,657	+	411,203
manufactured					
Total, Class II	347,340,675	419,535,762	377,002,871	+	67,632,801
III. ARTICLES WHOLLY OR MAINLY MANUFACTURED—					
A. Textile manufactures	130,114	82,237	8,208	-	121,846
B. Pottery, glass, ceramics, &c.	7,458,116	8,237,437	7,654,474	-	904,195
C. Iron and steel manufactures	11,770,264	19,905,214	15,300,263	+	2,764,387
D. Non-ferrous metals and alloys	3,153,245	55,713,076	49,941,707	+	7,094,469
E. Cutlery, hardware, tinplate	6,898,062	7,628,138	7,161,129	+	566,990
F. Metals and metal manufactures	3,002,140	2,422,957	3,105,350	+	8,864,556
G. Machinery	17,973,034	24,922,072	21,628,190	+	2,893,807
H. Miscellaneous manufactures	7,457,178	8,230,594	6,288,600	+	2,052,544
I. Cotton yarns and manufactures	2,803,705	3,426,324	3,135,780	+	302,075
J. Woolen and worsted yarns and manufactures	3,135,706	4,229,228	3,842,340	+	706,634
K. Silk yarns and manufactures	2,962,390	2,904,303	2,160,342	+	404,051
L. Manufactures of other textile	7,445,173	8,093,805	7,291,034	+	792,861
M. Apparel	7,277,014	8,285,278	8,025,242	+	238,036
N. Miscellaneous manufactures	2,275,164	2,275,164	2,275,164	+	517,264
O. Cosmetics, drugs, dyes and colours	12,579,044	13,467,534	13,241,627	+	643,907
Total, Class III	247,340,675	319,535,762	277,002,871	+	67,632,801

* The value of the Imports represents the cost, insurance and freight; or, when goods are consigned for sale, the value of the goods.

Values (c.i.f.) of Imports—Contd.

III. ARTICLES WHOLLY OR MAINLY MANUFACTURED—	Year ended December 31,			Increase or Decrease 1938-1937	Increase or Decrease 1938-1936
	1936	1937	1938		
P. Oils, fats and resins, mainly refined	36,124,809	46,561,452	44,125,248	+	2,403,104
Q. Leather and manufactures	9,721,329	9,788,744	6,444,873	-	3,343,871
R. Paper and manufactures	14,491,931	17,108,797	14,858,340	+	2,250,457
S. Vehicles (including locomotives)	6,514,397	6,105,887	6,105,887	+	369,549
T. Bikes, autos and aircraft	5,741,397	740,164	782,045	+	42,782
U. Miscellaneous articles wholly or mainly manufactured	20,986,130	22,809,920	21,088,602	+	1,721,318
Total, Class III	212,678,156	274,901,497	235,361,622	+	39,539,875
IV. ANIMALS, NOT FOR FOOD	1,915,626	5,080,178	3,218,511	+	288,323
V. PARCEL POST	3,652,333	5,657,203	4,996,702	+	739,389
Total	847,731,866	1,027,934,426	970,337,380	+	107,386,842
					72,653,720
Values (f.o.b.*) of Exports of Produce and Manufactures	Year ended December 31,			Increase or Decrease 1938-1937	Increase or Decrease 1938-1936
	1936	1937	1938		
I. FOOD, DRINK AND TOBACCO—					
A. Grain and flour	1,510,213	1,731,374	1,670,006	+	61,368
B. Feeding-stuff for animals	577,922	696,974	790,337	+	93,363
C. Animals, living, for food	1,310,075	1,310,075	1,310,075	+	174,760
D. Meat	1,060,188	1,150,075	93,949	+	19,760
E. Dairy produce	1,888,694	2,041,158	1,740,158	+	137,539
F. Fish, fresh, and vegetables	13,928,470	13,928,470	13,928,470	+	1,709,834
G. Beverages and cocoa, pre-	12,408,508	12,408,508	12,048,812	-	359,696
H. Other food	4,691,600	4,691,600	4,691,600	+	133,177
I. Tobacco	35,865,462	38,774,840	35,910,998	+	2,863,842
Total, Class I	29,299,230	37,633,920	37,410,967	+	212,962
II. RAW MATERIALS AND ARTICLES—					
A. Textile manufactures	1,127,877	1,351,039	1,057,412	-	294,287
B. Other non-metallic mineral products	394,103	890,370	504,828	+	293,635
C. Iron ore and scrap	2,116,927	2,116,927	2,998,735	+	991,808
D. Non-ferrous metals and alloys	965,024	965,024	435,320	-	529,704
E. Cutlery, hardware, tinplate	7,968,410	9,009,350	6,263,657	+	2,805,703
F. Metals and metal manufactures	13,883	9,803	3,803	+	3,803
G. Machinery	3,047,466	3,047,466	3,047,466	+	3,047,466
H. Miscellaneous manufactures	3,047,466	3,047,466	3,047,466	+	3,047,466
I. Cotton yarns and manufactures	1,750,201	1,800,486	1,708,432	+	691,714
J. Woolen and worsted yarns and manufactures	1,348,864	1,348,864	1,348,864	+	691,714
K. Silk yarns and manufactures	1,750,201	1,750,201	1,750,201	+	691,714
L. Manufactures of other textile	1,348,864	1,348,864	1,348,864	+	691,714
M. Apparel	1,348,864	1,348,864	1,348,864	+	691,714
N. Miscellaneous raw materials and articles, mainly un-	2,066,282	2,066,282	2,066,282	+	2,066,282
manufactured					
Total, Class II	51,336,707	64,659,164	56,933,607	+	7,705,657
III. ARTICLES WHOLLY OR MAINLY MANUFACTURED—					
A. Textile manufactures	29,299,230	37,633,920	37,410,967	+	212,962
B. Pottery, glass, ceramics, &c.	1,127,877	1,351,039	1,057,412	-	294,287
C. Iron and steel manufactures	394,103	890,370	504,828	+	293,635
D. Non-ferrous metals and alloys	2,116,927	2,116,927	2,998,735	+	991,808
E. Cutlery, hardware, tinplate	965,024	965,024	435,320	-	529,704
F. Metals and metal manufactures	7,968,410	9,009,350	6,263,657	+	2,805,703
G. Machinery	13,883	9,803	3,803	+	3,803
H. Miscellaneous manufactures	3,047,466	3,047,466	3,047,466	+	3,047,466
I. Cotton yarns and manufactures	1,750,201	1,800,486	1,708,432	+	691,714
J. Woolen and worsted yarns and manufactures	1,348,864	1,348,864	1,348,864	+	691,714
K. Silk yarns and manufactures	1,750,201	1,750,201	1,750,201	+	691,714
L. Manufactures of other textile	1,348,864	1,348,864	1,348,864	+	691,714
M. Apparel	1,348,864	1,348,864	1,348,864	+	691,714
N. Miscellaneous raw materials and articles, mainly un-	2,066,282	2,066,282	2,066,282	+	2,066,282
manufactured					
Total, Class III	51,336,707	64,659,164	56,933,607	+	7,705,657

* The value of the Exports represents the cost and the charges of delivering the goods on board the ship, and is known as the "free on board" value.

Values (f.o.b.) of Exports—Contd.

	Year ended December 31,			Increase or Decrease, 1938-1937	Increase or Decrease, 1938-1936
	1936	1937	1938		
III. ARTICLES WHOLLY OR MAINLY MANUFACTURED—					
A. Coke and manufactured fuel	2,992,322	3,301,709	3,301,709	—	309,387
B. Pottery, glass, shavings, &c.	8,663,917	9,974,129	9,618,627	—	954,710
C. Iron and steel and manu- factures thereof	35,966,668	48,371,349	41,698,968	—	6,632,880
D. Non-ferrous scrap	12,442,134	15,699,979	12,326,400	—	184,266
E. Cutlery, hardware, imple- ments, and manufactures thereof	8,149,137	9,709,725	9,092,022	—	892,885
F. Electrical goods and apparatus	10,020,515	12,628,044	13,413,916	—	3,413,916
G. Machinery	41,179,280	49,710,063	57,506,966	—	16,727,086
H. Leather	1,218,285	1,316,401	1,163,252	—	65,033
I. Cotton yarns and manu- factures thereof	61,592,036	68,508,703	49,684,368	—	11,817,668
J. Woollen and worsted yarns and manufactures thereof	32,315,547	35,202,846	28,815,755	—	5,397,702
K. Silks and manufactures thereof	1,291,368	1,109,662	1,298,718	—	94,280
L. Manufactures of other textile materials	9,809,554	10,221,111	8,519,476	—	1,411,990
M. Animals	2,062,576	2,171,625	1,965,823	—	206,802
N. Footwear	17,490,316	20,310,398	11,885,397	—	2,230,378
O. Chemicals, drugs, and dyes and manufactures thereof	21,091,094	24,653,065	22,048,681	—	96,687
P. Oils, fats and resins, manu- factured	4,011,021	5,877,019	5,967,984	—	456,360
Q. Leather and manufactures thereof	4,298,522	5,514,766	5,913,182	—	325,041
R. Paper, cardboard, &c.	6,716,629	8,693,578	6,931,282	—	1,841,953
S. Vehicles (including locomotives, ships, ships and aircraft)	22,250,889	29,925,718	41,620,716	—	12,268,827
T. Rubber manufactures, including rubber goods	1,569,136	1,657,118	1,648,528	—	79,392
U. Miscellaneous articles wholly or mainly manufactured	25,439,338	29,294,160	29,292,150	—	3,812,812
Total, Class III	310,377,091	401,626,340	365,272,065	—	21,594,074
IV. ANIMALS, NOT FOR FOOD					
V. FURBER POST	1,050,792	850,152	680,417	—	370,345
Total	11,883,927	12,181,398	11,906,172	—	112,546
Total	440,601,879	521,301,404	476,882,489	—	60,598,065

Values (f.o.b.) of Exports of Imported Merchandise

	Year ended December 31,			Increase or Decrease, 1938-1937	Increase or Decrease, 1938-1936
	1936	1937	1938		
I. FOOD, DRINK AND TOBACCO—					
A. Feeding-stuffs for animals	726,970	1,071,749	1,060,519	+	707,280
B. Animals, living, for food	28,050	49,507	68,138	+	30,088
C. Dairy produce	624,575	639,026	655,998	+	74,977
D. Meat and edible preparations	2,541,741	2,932,654	2,860,566	+	81,825
E. Beer, fruit and vegetables	1,290,751	1,341,035	1,326,500	+	45,848
F. Paraffins	6,198,081	6,509,013	6,126,864	+	445,049
G. Other food	1,180,558	1,312,478	1,260,069	+	20,422
H. Tobacco	1,048,476	1,048,476	1,048,476	+	1,048,476
Total, Class I	11,076,055	13,187,146	12,306,065	+	630,880

* The value of the Exports represents the cost and the charges of delivering the goods on board the ship, and is known as the "free on board" value.

Values (f.o.b.) of Exports of Imported Merchandise—Contd.

	Year ended December 31,			Increase or Decrease, 1938-1937	Increase or Decrease, 1938-1936
	1936	1937	1938		
	£	£	£		
II. RAW MATERIALS AND ARTICLES					
A. Coal	252,063	367,507	345,375	+	34,069
B. Other non-metallic minerals and the like	612	616	135	+	91
C. Iron ore and scrap	291,909	722,108	944,611	+	650,049
D. Non-ferrous scrap	1,552,128	2,037,527	2,507,617	+	698,553
E. Wool, raw and waste, and	13,210,666	14,430,970	12,265,292	+	1,865,142
F. Silk, raw, knitted and made	15,139	21,690	31,603	+	94,338
G. Other textile materials	181,352	189,449	191,023	+	324,030
H. Oils, fats and resins, manu-	720,737	680,262	516,658	+	174,979
I. Rubber, gutta-percha, and	9,385,376	11,661,849	9,508,821	+	2,096,821
J. Leather and manufactures	4,914,366	4,914,366	4,914,366	+	2,922,911
K. Miscellaneous raw materials	1,291,118	1,606,669	1,444,341	+	216,777
Total, Class II	32,931,899	36,575,116	29,255,323	+	2,678,606
III. ARTICLES WHOLLY OR MAINLY MANUFACTURED					
A. Cokes and manufactured fuel	254	787	57,085	+	264
B. Pottery, glass, shavings, &c.	69,255	64,321	7,256	-	8,538
C. Fisheries thereof	266,512	158,121	219,590	+	56,222
D. Non-ferrous scrap	6,125,801	13,638,536	9,107,078	+	2,084,277
E. Cutlery, hardware, imple-	736,806	816,420	729,417	+	7,449
F. Electrical goods and apparatus	198,510	116,855	136,201	+	41,131
G. Machinery	800,665	948,179	916,053	+	56,288
H. Leather	100,659	201,628	199,892	+	30,233
I. Cotton yarns and manu-	181,474	290,332	192,081	+	8,507
J. Woollen and worsted yarns	698,724	647,058	416,213	+	165,511
K. Silks and manufactures thereof	198,510	187,022	212,032	+	15,222
L. Manufactures of other textile materials	491,544	555,042	427,558	+	65,084
M. Animals	175,062	461,508	423,371	+	38,704
N. Footwear	56,811	44,519	48,126	+	8,615
O. Chemicals, drugs, dyes and manufactures thereof	403,415	465,288	471,668	+	6,370
P. Oils, fats and resins, manu-	1,825,321	1,982,135	1,643,186	+	730,792
factures thereof	1,075,288	1,197,255	902,738	+	170,520
Q. Leather and manufactures	67,800	74,907	69,263	+	1,305
R. Vehicles (including locomotives, ships and aircraft)	11,590	292,849	405,532	+	237,572
T. Rubber, gutta-percha, and	1,920,529	2,171,793	2,217,849	+	315,320
U. Miscellaneous articles wholly or mainly manufactured	15,333,564	21,443,012	18,345,270	+	2,311,906
Total, Class III	324,341	628,063	689,877	+	375,336
Total	60,768,859	75,133,671	61,607,983	+	839,136
IV. ANIMALS NOT FOR FOOD					

BANK OF ENGLAND

Pursuant to the Act 7th and 8th Victoria, cap. 32 (1844),

(000's omitted)

1	2	3	4	5	6	7	8
ISSUE DEPARTMENT						COLLATERAL COLUMNS	
Liabilities	DATES	Assets				Notes in Hands of Public	Minimum Discount Rate
Notes Issued	(Wednesdays)	Govt. Debt (£11,015) and Govt. Securities	Other Securities	Gold Coin and Bullion	Silver Coin		
£		£	£	£	£	£	Per cent.
516,407	Jan. 5.....	219,696	292	326,407	12	492,576	2
516,407	" 12.....	219,695	295	326,407	10	482,133	
526,407	" 19.....	199,683	305	326,407	12	475,671	
526,407	" 26.....	199,434	556	326,407	10	473,198	
526,407	Feb. 2.....	199,037	955	326,407	8	476,694	
526,407	" 9.....	199,327	662	326,407	11	476,071	
526,407	" 16.....	199,332	657	326,407	11	474,083	
526,407	" 23.....	199,337	653	326,407	10	471,524	
526,407	Mar. 2.....	199,607	382	326,407	11	478,344	
526,407	" 9.....	199,960	28	326,407	12	479,260	
526,407	" 16.....	199,965	23	326,407	12	479,476	
526,407	" 23.....	199,185	807	326,407	8	479,485	
526,407	" 30.....	199,190	800	326,407	10	485,410	
526,407	April 6.....	199,963	24	326,407	13	480,694	
526,407	" 13.....	199,838	150	326,407	12	497,248	
526,407	" 20.....	199,618	373	326,407	9	495,577	
526,407	" 27.....	199,618	373	326,407	9	489,262	
526,408	May 4.....	199,841	150	326,408	9	490,533	
526,408	" 11.....	199,741	250	326,408	9	482,190	
526,408	" 18.....	199,246	744	326,408	10	478,592	
526,410	" 25.....	199,496	493	326,410	11	480,200	
526,410	June 1.....	199,391	600	326,410	9	481,921	
526,410	" 8.....	199,917	74	326,410	9	490,721	
526,410	" 15.....	199,949	14	326,410	7	485,737	
526,412	" 22.....	199,900	2	326,412	8	483,272	
526,412	" 29.....	199,987	1	326,412	12	485,184	
526,412	July 6.....	199,945	45	326,412	10	488,231	
526,412	" 13.....	199,956	35	326,412	9	488,104	
526,412	" 20.....	199,515	171	326,412	11	487,110	
526,412	" 27.....	199,951	38	326,412	11	493,312	
526,412	Aug. 3.....	199,989	3	326,412	8	497,783	
526,412	" 10.....	199,469	521	326,412	10	489,994	
526,412	" 17.....	199,468	519	326,412	13	482,623	
526,412	" 24.....	199,282	707	326,412	11	478,690	
526,413	" 31.....	199,800	188	326,413	12	480,433	
526,414	Sept. 7.....	199,744	244	326,414	12	480,115	
526,411	" 14.....	199,459	533	326,414	8	478,593	
526,414	" 21.....	199,352	640	326,414	8	479,225	
526,414	" 28.....	199,452	538	326,414	10	500,921	
526,414	Oct. 5.....	199,917	72	326,414	11	505,784	
526,414	" 12.....	199,732	257	326,414	11	499,382	
526,414	" 19.....	199,812	177	326,414	11	486,391	
526,414	" 26.....	199,852	111	326,414	37	482,481	
526,414	Nov. 2.....	199,878	62	326,414	60	483,951	
526,414	" 9.....	199,812	100	326,414	88	482,090	
526,414	" 16.....	199,806	80	326,414	114	478,588	
526,414	" 23.....	199,211	655	326,414	134	476,058	
526,415	" 30.....	199,213	628	326,415	159	480,809	
556,416	Dec. 7.....	229,235	577	326,416	188	487,752	
556,416	" 14.....	229,431	359	326,416	210	495,349	
556,416	" 21.....	229,655	85	326,416	260	503,038	
556,416	" 28.....	229,666	49	326,416	285	504,727	

WEEKLY RETURN

for Wednesday in each Week, during the Year 1938

(000's omitted)

9	10	11	12	13	14	15	16	17	18
BANKING DEPARTMENT									
Liabilities				DATES (Wednes- days)	Assets				Totals of Liabilities and Assets
Capital (£14,553) and Rest	Public Deposits	Banker's Deposits	Other Deposits		Govt. Securi- ties	Dis- counts and Ad- vances	Other Securi- ties	Reserve (Notes and Coin)	
£	£	£	£		£	£	£	£	£
18,033	14,442	129,234	37,387	Jan. 5	108,338	15,088	21,137	54,533	199,096
18,064	13,190	123,368	36,780	" 12	90,168	15,795	20,508	64,931	191,402
18,095	11,052	124,358	36,938	" 19	104,388	12,967	21,766	51,320	190,441
18,116	13,555	113,072	37,349	" 26	93,943	10,428	18,957	53,764	182,092
18,144	11,404	111,383	36,591	Feb. 2	98,078	10,479	18,672	50,293	177,522
18,173	16,077	102,907	35,549	" 9	93,273	9,559	18,957	50,917	172,706
18,200	15,772	106,406	35,495	" 16	97,863	6,155	18,808	53,047	175,873
18,217	16,732	105,600	35,536	" 23	97,426	6,547	19,454	52,668	176,085
18,234	11,426	115,711	36,023	Mar. 2	104,446	7,076	21,043	48,829	181,394
18,248	12,572	114,280	36,091	" 9	105,221	6,525	21,473	47,972	181,191
18,261	11,110	119,016	35,667	" 16	112,206	3,640	20,465	47,773	184,084
18,262	15,557	109,143	36,647	" 23	105,086	6,635	20,096	47,792	179,609
18,281	17,767	108,132	37,383	" 30	110,816	8,702	20,221	41,824	181,563
17,673	12,833	112,447	36,759	April 6	111,886	10,120	20,150	37,556	179,712
17,686	17,732	103,951	35,996	" 13	116,136	9,598	19,648	29,983	175,305
17,703	18,027	106,161	36,125	" 20	117,616	8,232	20,824	31,644	178,314
17,711	10,889	113,289	36,512	" 27	113,996	7,064	19,380	37,961	178,401
17,723	10,742	117,453	35,971	May 4	117,766	8,189	19,265	36,669	181,889
17,738	36,595	87,944	35,459	" 11	105,741	7,602	19,410	44,983	177,736
17,753	28,502	93,175	35,969	" 18	98,346	7,754	20,750	48,549	175,399
17,765	20,477	91,249	36,103	" 25	95,671	9,528	19,419	46,976	171,594
17,780	24,868	102,803	35,462	June 1	109,676	8,934	19,976	42,327	180,913
17,804	11,732	111,110	35,425	" 8	111,421	7,938	20,167	36,545	176,071
17,840	11,556	109,062	35,216	" 15	114,401	5,681	20,693	41,529	181,704
17,881	21,050	105,513	35,397	" 22	110,176	5,500	20,627	44,054	180,357
17,923	10,537	125,476	36,137	" 29	119,491	7,344	21,067	42,171	190,073
17,977	12,546	115,663	35,989	July 6	111,891	10,711	20,402	39,171	182,175
18,014	13,219	113,005	35,490	" 13	109,566	10,314	20,558	39,290	179,728
18,034	22,485	107,339	34,670	" 20	109,821	9,305	23,086	40,316	182,528
18,081	11,187	116,356	35,052	" 27	115,761	9,476	21,269	34,170	180,676
18,132	9,490	113,424	34,741	Aug. 3	114,671	9,606	21,781	29,729	175,787
18,146	19,315	106,079	34,514	" 10	109,716	9,239	21,544	37,555	178,054
18,172	20,107	105,723	34,067	" 17	104,641	6,462	21,992	44,974	178,069
18,176	23,960	101,560	34,073	" 24	101,911	6,267	20,642	48,949	177,769
18,207	27,758	94,744	34,376	" 31	102,061	5,370	22,327	47,327	177,085
18,220	32,151	91,260	34,852	Sept. 7	101,336	5,354	22,073	47,720	176,483
18,233	21,570	99,593	36,377	" 14	98,531	5,880	22,070	49,292	175,773
18,242	18,431	100,861	39,424	" 21	97,606	6,090	24,563	48,099	176,958
18,260	11,447	99,923	40,210	" 28	112,751	7,306	22,828	26,945	169,830
17,629	12,054	109,703	37,141	Oct. 5	121,871	10,205	22,477	21,974	176,527
17,651	28,267	94,859	36,579	" 12	114,531	9,554	21,853	31,418	177,356
17,674	33,763	90,928	35,862	" 19	104,931	8,000	23,932	41,364	172,227
17,680	25,039	100,422	35,501	" 26	107,581	4,157	21,609	45,295	178,042
17,700	14,133	109,482	36,436	Nov. 2	102,386	10,449	21,144	43,772	177,751
17,730	15,937	109,498	35,504	" 9	101,571	11,103	20,979	45,016	178,669
17,744	35,047	89,486	35,038	" 16	95,236	12,405	20,587	49,087	177,315
17,787	31,730	92,219	34,970	" 23	91,801	12,184	21,128	51,623	176,736
17,825	23,105	97,082	37,190	" 30	90,166	17,556	20,635	46,845	175,202
17,854	18,628	102,945	35,944	Dec. 7	66,136	17,871	21,503	69,861	175,371
17,887	15,009	99,547	36,902	" 14	68,361	16,819	21,095	62,170	169,045
17,931	12,522	98,338	37,312	" 21	72,121	14,911	24,796	54,275	166,103
17,966	15,938	101,027	36,755	" 28	69,216	28,539	21,456	52,475	171,686

FOREIGN EXCHANGES.—*Quotations as under, LONDON on Paris, Berlin and Calcutta; New York and Hong Kong on LONDON, 1938.*

DATE (Thursdays)	1	2	3	4	5	6		7
	London on Paris	London on Berlin	London on Calcutta	New York on London	Hong Kong on London	Price per Ounce		
	Cables (middle rate)	Cables (middle rate)	Demand (middle rate)	Cables (closing rate)	T.T.	Gold Bars (fine)	Silver Standard Bars (cash)	
1938.	<i>f. c.</i>	<i>Reich- marks.</i>	<i>s. d.</i>	<i>\$ c.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	
Jan. 13.....	153 $\frac{3}{8}$	12-40 $\frac{1}{2}$	1 6 $\frac{1}{8}$	4-99 $\frac{1}{2}$	1 3	139 7	1 7 $\frac{7}{8}$	
„ 27.....	154 $\frac{1}{2}$	12-42 $\frac{1}{2}$	1 6 $\frac{1}{8}$	5-00 $\frac{1}{2}$	1 3	139 8	1 8 $\frac{1}{4}$	
Feb. 10.....	152 $\frac{1}{2}$	12-41 $\frac{1}{4}$	1 6 $\frac{1}{8}$	5-01 $\frac{1}{2}$	1 3	139 8	1 8 $\frac{1}{2}$	
„ 24.....	154 $\frac{1}{8}$	12-40	1 6 $\frac{1}{8}$	5-01 $\frac{1}{8}$	1 3	139 9 $\frac{1}{2}$	1 8 $\frac{1}{4}$	
Mar. 10.....	158 $\frac{3}{4}$	12-41 $\frac{1}{2}$	1 6 $\frac{1}{4}$	5-01 $\frac{1}{4}$	1 3	139 6 $\frac{1}{2}$	1 8 $\frac{1}{2}$	
„ 24.....	162 $\frac{1}{4}$	12-37 $\frac{1}{4}$	1 6 $\frac{1}{4}$	4-96 $\frac{1}{4}$	1 2 $\frac{1}{2}$	140 1 $\frac{1}{2}$	1 8 $\frac{1}{8}$	
Apr. 7.....	162-0	12-37 $\frac{1}{4}$	1 6 $\frac{1}{8}$	4-96 $\frac{3}{4}$	1 2 $\frac{7}{8}$	140 0 $\frac{1}{2}$	1 7 $\frac{1}{2}$	
„ 21.....	159 $\frac{1}{4}$	12-40	1 6 $\frac{3}{4}$	4-99 $\frac{1}{4}$	1 2 $\frac{7}{8}$	139 6 $\frac{1}{2}$	1 6 $\frac{1}{2}$	
May 5.....	178 $\frac{2}{3}$	12-40 $\frac{1}{2}$	1 5 $\frac{2}{3}$	4-99 $\frac{1}{2}$	1 2 $\frac{7}{8}$	139 7	1 6 $\frac{3}{8}$	
„ 19.....	177 $\frac{1}{4}$	12-36 $\frac{1}{2}$	1 5 $\frac{1}{2}$	4-96 $\frac{1}{2}$	1 2 $\frac{7}{8}$	140 1 $\frac{1}{2}$	1 6 $\frac{1}{4}$	
June 2.....	178 $\frac{1}{2}$	12-32	1 5 $\frac{1}{2}$	4-94 $\frac{7}{8}$	1 2 $\frac{7}{8}$	140 8	1 6 $\frac{5}{8}$	
„ 16.....	178 $\frac{1}{2}$	12-30 $\frac{1}{2}$	1 5 $\frac{1}{2}$	4-97 $\frac{1}{2}$	1 2 $\frac{7}{8}$	140 10	1 6 $\frac{3}{4}$	
„ 30.....	177 $\frac{1}{4}$	12-30 $\frac{1}{2}$	1 5 $\frac{1}{2}$	4-95 $\frac{1}{2}$	1 2 $\frac{7}{8}$	140 8 $\frac{1}{2}$	1 7 $\frac{1}{8}$	
July 14.....	178 $\frac{2}{3}$	12-27 $\frac{1}{2}$	1 5 $\frac{2}{3}$	4-93 $\frac{3}{4}$	1 2 $\frac{1}{2}$	141 2	1 7 $\frac{1}{2}$	
„ 28.....	178 $\frac{1}{4}$	12-24 $\frac{1}{4}$	1 5 $\frac{2}{3}$	4-91 $\frac{7}{8}$	1 3	141 5	1 7 $\frac{1}{8}$	
Aug. 11.....	178 $\frac{5}{8}$	12-17 $\frac{1}{4}$	1 5 $\frac{3}{4}$	4-87 $\frac{1}{2}$	1 3	142 4 $\frac{1}{2}$	1 7 $\frac{1}{2}$	
„ 25.....	178 $\frac{2}{3}$	12-17 $\frac{1}{2}$	1 5 $\frac{3}{4}$	4-87 $\frac{1}{2}$	1 3	142 5 $\frac{1}{2}$	1 7 $\frac{1}{2}$	
Sept. 8.....	178 $\frac{5}{8}$	12-04	1 5 $\frac{2}{3}$	4-82 $\frac{1}{2}$	1 3	144 1 $\frac{1}{2}$	1 7 $\frac{1}{2}$	
„ 22.....	178 $\frac{1}{2}$	12-05	1 5 $\frac{2}{3}$	4-81 $\frac{1}{2}$	1 3	143 11	1 7 $\frac{1}{2}$	
Oct. 6.....	178 $\frac{3}{4}$	12-01	1 5 $\frac{2}{3}$	4-80 $\frac{1}{4}$	1 3	144 5	1 7 $\frac{1}{2}$	
„ 20.....	178 $\frac{3}{4}$	11-88	1 5 $\frac{2}{3}$	4-75 $\frac{1}{4}$	1 2 $\frac{7}{8}$	145 9 $\frac{1}{2}$	1 7 $\frac{1}{2}$	
Nov. 3.....	178 $\frac{5}{8}$	11-88	1 5 $\frac{1}{2}$	4-75 $\frac{3}{4}$	1 3	146 1 $\frac{1}{2}$	1 7 $\frac{3}{8}$	
„ 17.....	178 $\frac{1}{2}$	11-76	1 5 $\frac{1}{2}$	4-71 $\frac{1}{8}$	1 2 $\frac{1}{2}$	147 10 $\frac{1}{2}$	1 7 $\frac{3}{8}$	
Dec. 1.....	178 $\frac{1}{2}$	11-68	1 5 $\frac{2}{3}$	4-68 $\frac{1}{2}$	1 2 $\frac{1}{2}$	148 6 $\frac{1}{2}$	1 8 $\frac{1}{2}$	
„ 15.....	178 $\frac{1}{2}$	11-66	1 5 $\frac{2}{3}$	4-67 $\frac{1}{2}$	1 2 $\frac{1}{2}$	148 8	1 8 $\frac{1}{2}$	
„ 29.....	177 $\frac{1}{4}$	11-63	1 5 $\frac{2}{3}$	4-65 $\frac{1}{2}$	1 2 $\frac{1}{2}$	149 0 $\frac{1}{2}$	1 7 $\frac{1}{2}$	

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THE ECONOMICS OF THE THIRD REICH

By NORMAN CRUMP

[Read before the ROYAL STATISTICAL SOCIETY, January 17th, 1939, the PRESIDENT, PROFESSOR A. L. BOWLEY, C.B.E., Sc.D., F.B.A., in the Chair.]

WHEN I first considered the idea of offering the Royal Statistical Society a comparison of the economic methods and results of Germany and other countries, I was seriously deterred by the audacity of the proposal. No one can really claim the right to describe and analyse economic conditions in a foreign country, unless he has lived there and has an intimate acquaintance with the people, and I am only too conscious of my imperfections in that respect. Again, Germany is a country where complete statistical information is lacking, not through any imperfections of the Government's admirable statistical service, but as a deliberate act of policy. Finally, Germany and her present Government provide subjects upon which most of us hold decided, and not always identical, opinions.

Politics as such have rightly no part in our proceedings. There is one condition upon which a paper such as this could be acceptable, and that is that it should be confined to a strictly objective examination of Germany's methods and results. It is true that I pose certain questions throughout the paper, and indeed I end upon a questioning note. But my whole object is to confine this paper to an economic basis. If I might permit myself one introductory observation of a slightly controversial character, it is that our views, whatever they may be, upon the political system of a country need not preclude us from studying a new and comprehensive economic experiment, to see if there is anything we can learn from it and apply to our vastly differing conditions. That is why part at least of the paper consists of a comparison, and also a contrast, between Germany, the United Kingdom, and the United States.

I have deliberately confined the statistical data in this paper

mainly to the five years 1933–37. First, this roughly covers the period of recovery, and it is of some importance to learn how the German recovery compared with that of other countries. We are still too near the 1937 turn of the tide for it to be safe to make a similar comparison in respect of the recession. Next, the continuity of German economic statistics has been disturbed this year first by the Austrian Anschluss and later by the absorption of the Sudetenland. Finally, this paper is necessarily based upon information and experience gathered by me during a visit to Berlin in October 1937, and, much to my regret, lack of time has prevented a repetition of my visit.

Nazi economics, both internal and external, have for a long time been a mystery to many people in this country, but I have been forced to the conclusion that it is a mystery partly of our own making. Economics is a derived science—derived from the meeting-ground of law, mathematics, and psychology. Once a country acquires a different system of law, a different concept of personal rights and duties, and a different psychological outlook, it inevitably evolves a different economic system, expressed in a different economic language. Consequently, so long as we discuss German economic methods in our traditional and familiar economic terms, we run grave danger of falling into a confusion of thought.

I am not suggesting this in any spirit of dogmatism, but merely repeating the conclusion to which I was driven on my first contact with the Germany of the Third Reich. Nor do I mean that the Third Reich suddenly gave birth to a new economic system for Germany. On the contrary, the process of economic evolution has been gradual and irregular—indeed, one could correctly describe it as opportunist. But behind it there lies a new economic concept, which for the moment I might describe by saying that the country's unused labour force is regarded as the country's ultimate reserve—and a reserve to be brought into active use without delay. I shall elaborate this point later, but meanwhile another fundamental point must be made. The fact that Germany is evolving and practising an economic system which differs radically from that of most countries in the world means that there is an economic discontinuity whenever the German frontier is crossed. Hence the present German system of exchange control, the regulation of imports and exports, exchange clearing and payments agreements, and all the similar paraphernalia of to-day.

Nor can we lay on the Nazi movement full responsibility for Germany's present economic system. The evolution began in certain respects before the establishment of the Third Reich. The depression of 1930–32, combined with Germany's bitter memories

of the "inflation" of the early twenties, had saddled Germany with severe unemployment, attenuated gold reserves, an adverse balance of payments on current, and still more on capital, account, and the beginnings of exchange restrictions, some time before the Nazis achieved complete power in 1933. Thus the Third Reich partly took over what it found, and if it has erected an elaborate and strange superstructure, it has built to some extent upon foundations already laid.

Germany—The Internal Aspect

I have already suggested that Germany's foreign exchange and trade system represents an economic discontinuity between Germany and the outside world. This makes it convenient to divide any analysis of Germany's economic system into two sections—internal and external. It also means that logically the internal aspect must be considered first, because it is causal while the external aspect is consequential. Quite bluntly, German internal economics are based upon a new conception of the meaning and functions of money and employment. The driving-force behind this new conception is found in the relation developed in the Third Reich between the individual and the State. To understand this, it must be remembered that the dividing line between the State and "the Party" has now become very vague. The majority of Germans to-day evince, in greater or less degree, an enthusiasm for both the State and the Party. Of the rest, most think it wise to display at least a willing acquiescence. Quite apart from questions of political beliefs, most Germans have a traditional hankering after leadership, and are easily guided into mass movements of an emotional character. I do not wish to explore this question any further, for I realize that I am getting beyond my terms of reference. But it seemed essential to allude briefly to the existence of this driving force, which finds no exact parallel in other countries to-day.

Broadly speaking, the primary object of Nazi economic policy is the abolition of unemployment and the provision of useful work for all. The fact that this aim fits in with other aims, such as rearmament, public works, and even the approach to self-sufficiency and the minimizing of the fear of blockade, was of undoubted convenience to the present rulers of Germany; and one cannot assume that they did not see this picture as a whole. But this does not conflict with this view of their primary economic object. In the Nazi economic concept unemployment is not an unqualified liability, but a reserve. If there is surplus labour, then that labour must be put to useful work—useful from the national point of view. And

the whole economic system must be adapted and modernized to that end. It equally follows that the fruits of the country's labour represent the country's real wealth. Even gold takes a subordinate place in this respect.

It follows that money has assumed a different meaning. Less emphasis is laid upon its function as a store of value, and more upon its function as a medium of exchange. Lack of money or credit must not be allowed to impede employment or development, and if the money is lacking, it must be created. Money and credit, in fact, are essential instruments of national progress, and as such they must be both adequate and efficient. Yet even here there are certain limitations. Even the Nazi movement has not been able to eradicate the memories of the inflation period, or been willing to risk the disruptive reactions of a new major depreciation of the internal or external value of the currency. For these reasons alone, the devaluation of the Reichsmark has been ruled out, while prices and wages at home are subjected to a rather indeterminate but effective system of control. Also, if money is to be an efficient instrument, it must not be allowed to dissipate its force in a rise in internal prices. Any increase in the supply of money must be fully paralleled by an expansion in activity.

The fact that the main function of money is to act as a medium of exchange does not mean that no importance is attached to savings as such. On the contrary, the growth of new savings, as a capital fund, is welcomed, always remembering that those savings also must be used to the benefit of the nation. In proof of this, the old system of *girozentralen* has been adapted so as to provide a channel for the collection and redistribution of savings. In some respects, too, saving is compulsory, as witness the limitation of industrial dividends and the diversion of surplus profits into loans to the Reich. The control over prices also means that money can still retain its function as a store of value. But in the last resort even the sanctity of savings must be subordinate to the needs of the nation.

Bearing all this in mind, has there been inflation in Germany during the past six years? The official view is, no. "There can be no inflation," I was told, "unless there is a rise in prices. For that is the only possible symptom and definition of inflation." Considering the system of price control, this answer reminds me of the New York speak-easy which could never be raided because the Prohibition Agent always rang the alarm bell at the foot of the stairs five minutes before he came in.

This brings me to an examination of German banking statistics. When the Nazi movement achieved power, it was confronted with

a serious shortage of gold. It has turned that shortage into an opportunity. It was able to make a big reflationary effort to finance rearmament and public works, and to bring the unemployed back into work, without the final results being an inordinate expansion of either German currency or credit. Whereas reflation in England and the United States was partly based upon an expansion of the national gold reserves, reflation in Germany was based upon special bills and other credit instruments created for the purpose of financing national needs and providing employment. The fact that Germany was not simultaneously adding to her gold reserve meant that this could be done without creating too unwieldy a mass of currency or bank deposits. Thus German reflation could be kept within bounds, in spite of the perilous methods adopted. Its combination with price control, indeed, made it more effective than the parallel British and American reflation. It is true that the stimulus of rising prices was lacking in Germany, but other stimuli were readily forthcoming.

To illustrate this point, I have prepared the tables given in Appendix I. This shows that in spite of her new methods of finance, Germany has experienced no inordinate expansion either in her note circulation or in her total bank deposits. Her note circulation has only risen relatively between 1932 and 1937 from 100 to 154.2, compared with increases from 100 to 135.3 in Great Britain, and from 100 to 159.0 in the United States. Deposits at the banks increased by only 13.2 per cent. between 1932 and 1937, and in contrast to British experience were lower in 1937 than in 1929. So far the usual symptoms of inflation are lacking. There has only been a moderate reflation.

On the other hand, the Reichsbank's gold and foreign exchange reserves have shrunk almost to vanishing point. The note circulation is necessarily inconvertible, and the average German cannot obtain gold at all, and can only obtain foreign exchange for authorized purposes. It is necessary and sufficient for the present to say that this is the inevitable consequence of Germany's attenuated gold reserves. These restrictions also act as an essential prop to the currency, but the chief prop is that the paper Reichsmark is the only legal tender inside the country, and that any individual mistrust in it would be regarded as unpatriotic. On the other hand, the Reichsmark is not legal tender beyond Germany's frontiers, and its exchange into foreign legal tender currencies is subject to many restrictions. Therefore no foreigner dares to acquire as an investment Reichsmark securities or other claims payable in Reichsmarks, but only dares to acquire Reichsmarks up to the amount of his immediate needs. The result is that whether

or not there has been internal inflation, the external depreciation of the currency is only prevented by a comprehensive system of exchange control.

The movements shown in Appendix I also raise the whole question of German internal banking and finance. The German banking system is less homogeneous than the British system of networks of branch banks covering the whole country. Branch-banking, it is true, is far from unknown in Germany, but in the days prior to the Third Reich the system was far more heterogeneous than it is to-day. I am not labouring this point in detail, because under the present régime a fair amount of co-ordination has taken place, both of the commercial banks and the savings banks. All are now working to the same end, that is, the national interest as defined by the Third Reich.

Of much more importance is the fact that in Germany, as in the United States, the banks are accustomed to re-discount directly at the Reichsbank; whereas in England the banks reinforce their cash by calling from the money market, which in turn re-discounts at the Bank of England. This distinction is less academic than it superficially appears to be. Under the British system there is a limit to the total volume of re-discounting, or rather to the rate at which it can take place, for the discount market's capacity to handle bills is limited by its own capital, while its power to approach the Bank of England is guided by custom. Also the discount market can only re-discount at a loss, which again places a very effective brake on the extent to which it would act as a channel for bills to percolate through to the Bank of England. Besides, the British clearing banks cannot call from the money market more than they have lent, while if the market had already re-discounted heavily at the Bank, it would be chary about taking up fresh bills and borrowing fresh short money from the clearing banks. The result is that the British banks have always to watch their cash. If it is true to describe the Bank of England's gold and the banking department's reserve as our first line of defence, the clearing banks' cash is our second line.

In Germany that second line no longer exists. Any bill bearing three approved names is eligible for re-discount at the Reichsbank, and the Reichsbank, under the Third Reich and up to the end of 1937, was always ready to re-discount. The first consequence is that the commercial banks ceased to worry about their cash reserves, for they knew that they could always obtain fresh cash by re-discounting at the Reichsbank. Appendix I shows how small a cash ratio the German banks operate on, and it also shows that while deposits have risen since 1932, cash has shrunk.

The next consequence is that under this system the banking system provides an ideal instrument for supplying the Government with an almost unlimited amount of finance. The mechanism of the "special bills," of which so much has been heard, is delightfully simple. The contractor, who is not necessarily engaged on Government work, but who in the earlier days may simply have been "giving employment," draws his bill. This is accepted and endorsed by various *ad hoc* institutions, and so acquires the number of names needed to make it eligible for re-discount at the Reichsbank. The contractor obtains his funds by discounting the bill at his own bank, which is only too glad to take so eligible and liquid an asset. If his bank in turn needs cash, it re-discounts it then and there at the Reichsbank. When the bill matures, it is renewed unless and until it can be either paid off or replaced by other forms of finance. But in the early days of the Third Reich, when the main objective was to get people back to work and also to finance the Government's needs, the question of repayment was left in the background. Indefinite renewal provides for the moment an easy way out.

Appendix I shows how this system has worked in practice. Since 1932 discounts at the commercial banks have risen from Rm. 3,349 to Rm. 7,717 millions. In addition, re-discounts at the Reichsbank have risen from Rm. 2,807 to Rm. 6,132 millions. These figures take no account of the mass of bills held by Insurance Companies and other corporate and private investors. Meanwhile the increase of Rm. 3,325 millions in the Reichsbank's re-discounts is paralleled by an expansion of Rm. 2,933 million in the note circulation. The close correspondence between these two increases throws a clear light on both the object and the effect of this form of finance, and also upon the fiduciary character of the present note issue. A separate table in Appendix I also shows that this form of finance has been provided so lavishly, and has also had such a revivifying effect on German industry and commerce, that commercial bank advances have been progressively falling since 1932. The commercial banks, in fact, are lending less to their customers in the form of loans and more in the form of these bills. Meanwhile some progress must also have been made in their funding, as is shown by the increase in the commercial banks' investments.

Still, the fact remains that the increase in the German note circulation and bank deposits is not disproportionate to the parallel increases in Great Britain and the United States. So far as the three countries' central banks are concerned, both the Bank of England and the Federal Reserve Banks have experienced, for good or for evil, a liberal gold deflation which the Reichsbank has escaped. I am not sure that this is not the real contrast. The Reichsbank

was unable to get gold, and so was able to take bills. German opinion now argues that bills are better than gold, for their creation facilitates useful work, which creates real wealth. Granted the necessary consequences that this forces upon Germany a closed economy, I am not sure that we can entirely dismiss this argument by reference to the fox and the grapes. Incidentally, both the Bank of England and the Federal Reserve system acquired securities during 1932-37 as well as gold, while the increase in the investments of the British and American commercial banks was even more marked. The real contrast between England and Germany may be that while the British banks acquired securities already in existence, and while they purchased from other investors, the German banks acquired new securities specially brought into existence to finance new activity. In this respect the United States occupies a half-way house, but I throw out the suggestion that fundamentally the contrast is more apparent than real, and that for the short run the German technique may have been more advantageous from the national point of view.

However, there is no doubt that the German kind of reflation worked equally with the British and American kind. In one respect the result was more efficacious, because there has been an almost complete disappearance of unemployment in Germany. Also recovery in Germany, as elsewhere, brought with it an expanding national income, a greater buoyancy of the tax revenue, an expansion in the revenue flowing into the Treasury, and a larger volume of savings. There may have been little freedom and a low standard of living, but the obverse of the medal is that there was less wastage, whether human, material, or financial. If I might risk here an *obiter dictum*, I am not sure that the two are separable. Up to a point we may have to choose between social and political liberty and economic efficiency.

The effect on the national income and tax revenue is illustrated in Appendix II, which also contains a table showing the growth in the Reich's disclosed debt, both long-term and floating. I have also included a table showing the growth in British and German tax revenue. In spite of the extent of recovery and the disappearance of unemployment, the total national income was in 1937-38 still short of the 1929 level; while the rise in the burden of taxation from 14.8 per cent. of the national income in 1932 to 19.9 per cent. in 1937-38 points as much to heavier taxation and efficient collection as to a natural buoyancy of the revenue. Also the burden of taxation up to that time was certainly not heavier than our own and less than that of France. The comparison of British and German tax revenue shows that there has been a much bigger increase in

Germany since 1932, but that since 1929 the increase is only 46.8 per cent. in Germany and 28.6 per cent. in Great Britain. The increase in the disclosed national debt is also not excessive. Between 1932 and 1937, it rose by only 55 per cent. against an expansion of 41 per cent. in the national income. It was, however, a definitely greater burden than in 1929.

Reich expenditure has not been disclosed since the 1934-35 budget, which gave a total of Rm. 8,000 millions. Since then the bulk of Germany's rearmament bill has had to be met. Apart from the growth in the revenue and in disclosed borrowing, it has been met partly by appropriations from the surplus of the Unemployment Insurance Fund (derived from the progressive decrease in unemployment) and largely from undisclosed borrowing by means of the issue of bills of the type already described. Thus the general use of the banking system as an instrument for the abolition of unemployment was turned into the more special use as an instrument for financing rearmament.

A year ago, in the *Financial Times*, I hazarded a guess at the total cost of rearmament and public works, and also at the total amount of undisclosed borrowing during three years 1935-38. My calculations, which have since received a certain amount of independent confirmation, depended upon an extrapolation founded on the hope entertained at the end of 1937 that undisclosed borrowing was about to cease. Tax revenue and disclosed borrowing had, it was hoped, risen to the point where they could bridge the whole gap. Acting on this hope, I extrapolated a possible budget for 1938-39, and tacked on to it such details as were available for previous years:—

	Net Revenue	Ordinary Expenditure †	Unemployment Fund Surplus	Disclosed Borrowing	Undisclosed Borrowing
	(Rm. millions)				
1935-36 ...	7,064	7,200 †	500 †	1,900	?
1936-37 ...	8,881	7,500 †	1,200 †	1,900	8
1937-38 ...	10,900 *	7,500 †	2,000 †	1,900 †	3
1938-39 ...	13,000 †	7,500 †	2,000 †	3,000	nil

* Estimated. † My guess. ‡ Less miscellaneous revenue.

If the 1938-39 budget was to balance without undisclosed borrowing, it follows that extraordinary expenditure (mainly on defence) was expected to be Rm. 10,500 millions. It was equally hoped at the end of 1937 that the cost of defence had reached and was passing its peak. This suggested the guess that the annual

cost of rearmament and public works for each of the three years 1935–38 lay between Rm. 10,000 and Rm. 15,000 millions. If the total cost for the three years was Rm. 35,000 millions, then the details given in the previous table point to total undisclosed borrowing during that period of about Rm. 22,000 millions. This estimate (or rather guess) is very considerably in excess of the increase in the banking system's discounts, so much so as to suggest that the bulk of the new bills created by this borrowing are held elsewhere.

The basis of this hope must have been frustrated by the political events of the current year, but nevertheless early in 1938 a qualified attempt was made to give effect to it. Undisclosed borrowing in the form of bills eligible for re-discount at the Reichsbank ceased, and instead a new form of "delivery bill" was created for the payment of contractors, this bill not re-discountable without restriction or limit. The result has been a growing shortage of working capital in the hands of manufacturers, for they have found their capital immobilized to an increasing extent in these new bills. This is one explanation of the August slump on the bourses. My own view is that the authorities, having declared, prematurely as it turned out, their intention of doing away with undisclosed borrowing, nevertheless tried to carry their new intention into effect. I can, however, detect another motive. There must have been some nervousness at the growing use of the commercial banks as a pipeline by which bills passed from the original holder to the Reichsbank, especially as the commercial banks were in a position to replenish their cash at will. It may have been felt that if this form of borrowing was terminated, the banks would be forced to establish and regard their cash as a second line of defence. I should add that this is a purely personal opinion.

I pass from banking and finance to the structure of German prices, the cost of living and wages. It is very difficult, I must admit, to get at the exact system of price control in Germany. Perhaps the best line of approach is from imported goods on the one hand and from wages on the other. As Appendix III shows, there has been some increase in the average cost of imports, amounting to 11·2 per cent. between 1932 and March 1937, and this is in close correspondence with the rise of 9·7 per cent. in German wholesale prices generally. It is much less marked than the contemporaneous increase in British and American wholesale prices. Here is found both a consequence and a powerful explanation of the refusal to devalue the Reichsmark. Devaluation, among other consequences, would have rendered impossible the German policy of internal price stability. The average level of import prices must also have been kept down by the system of external trade, including exchange

clearing, aski marks, and last, but not least, bulk buying of the chief products of contiguous countries.

The same relative stability is apparent in the average level of wages. Again there has been some advance, in both "money" and "real" wages, but it is not very marked. I am not sure that the simplest explanation here is not the disappearance of all the machinery for securing wage increases. In the early days of the Third Reich all the Trades Unions were absorbed by the Arbeitsfront—a Party rather than a State organization while the Nazi concept of relations between employers and employed also stands in the way of arbitrary demands for higher wages.

Granted an absence of any big increase in either average import prices or wages, two of the chief causes of a rise in internal prices no longer exist. Hence the machinery of control finds relatively easy ground in which to work. This machinery, too, is both elastic and indefinite. For example, there is no rigidly uniform scale of retail food prices all over the country. To quote only one of many examples, lager beer in July 1936 varied in price from Rpf. 46 per litre in Nuremberg to Rpf. 90 in Essen. By July 1937 the Nuremberg price had risen to Rpf. 50, or by 8.6 per cent., while the Essen price had fallen to Rpf. 82, or by 8.9 per cent. As in this country, a single composite cost-of-living index number can mask a host of wide fluctuations.

The average increase in the cost-of-living index is 4.1 per cent. since 1932, and 3.2 per cent. since 1934 (up to 1937). This is rather less than the increase in this country, but naturally an index number does not tell the whole story. In Germany several qualifications are necessary. First there has been some deterioration in quality, in clothing as well as in food. Next there are temporary, local, and spasmodic shortages of certain kinds of food, leading not so much to definite, continuous rationing, as to a certain limitation of choice, and also to a tendency of shopkeepers to decline to sell to other than their regular customers. I do not wish to pitch this either too high or too low, for nothing short of a survey of conditions throughout the country could provide even an approximate answer. I am satisfied, however, that there has been an invisible increase in the cost of living, which is superimposed on what the statistics reveal.

In the same way, the wage statistics hardly tell the whole story. Wage-earners are more heavily taxed than they are in Great Britain, while, in addition to deductions for insurance, there are voluntary contributions to the Arbeitsfront, including the Strength through Joy movement, and to the Winter Help Bureau. I am not suggesting that the worker does not get a return for these contributions, and

certainly holidays and recreations appear better organized in Germany than in England. Still, the following facts remain. In 1936 the wage-earners paid Rm. 1,500 millions in taxes, Rm. 2,125 millions in insurance contributions and Rm. 500 millions in contributions to the Arbeitsfront and Winterhilfe. These worked out at about Rm. 200 a head, or at just over 13 per cent. of the total income of the country's wage-earners. The fact that part of these contributions were nominally voluntary hardly affects the statistical validity of these calculations.

This relative stability of wages is undoubtedly reflected in the very moderate increase in the average price of finished goods. It is also a contributor, but not the only contributor, to the decline of 11·8 per cent. in the average price of German exports.

To complete the picture, Appendix IV gives details of production and employment. These should be compared with the details of national income and tax revenue appearing in Appendix II. To judge from these statistics, there has not only been a recovery from the depths of 1932, but production is now above the 1929 level. The same, however, is equally true of Great Britain, as the following comparative figures show :—

	Production		Employment	
	U.K.	Germany	U.K.	Germany
1929	112·2	187·8	100·2	143·0
1932	100	100	100	100
1937	139·3	220·6	122·8	148·2
1937 v. 1929...	+24·3%	+17·5%	+12·5%	+3·6%

Germany had fallen deeper into the depths in 1932, and needed more drastic methods of rescue. Yet comparing 1937 with 1929, Great Britain shows the greater progress.

The German productive and employment figures also bring to light the emphasis laid on the capital-goods industries, and, by contrast, the limited progress in the consumers' goods industries. Employment in building has trebled and in machinery has doubled. Yet the textile trades are employing only 15 per cent. more people than in 1933, and the food industries only 5·7 per cent. more people. This throws a very clear light upon the nature of the German recovery, and proves how the whole force has been thrown in the direction of capital works, including rearmament, at the sacrifice of an equivalent raising of the general standard of living.

I am concluding this section with a few tentative comments, but at this stage I could wish that I were opening a discussion rather than reading a formal paper. The real question is, has

Germany discovered the secret of perpetual motion, or is she, in American parlance, pulling herself up by her own boot-straps? Up to a point, Germany displays many of the familiar symptoms of a recovery aided by monetary reflation. There is a definite similarity between German, British and American experience during the years 1932-37. There is no doubt about the increase in production in all three countries, and, according to one system of measurements, national income and national production are identical terms. But apart from variations in stocks of commodities, a growth in production implies a growth in consumption, and here the divergence begins to appear. Goods produced can be divided into four main categories :—

Goods for private consumption.

Goods for public consumption.

Private investment goods.

Public investment goods.

In Germany the last two, especially the last, get pride of place. The first two are left with the residual margin of production.

There are various reasons for this. First, public works provide the easiest way for a Government to create employment. And rearmament, being the most familiar form of public works, is also the easiest to carry out. This is quite apart from the over-riding political objectives of the Third Reich.

The refusal to devalue the currency and the absence of gold reserves led inexorably to the regulation of imports, and so to the desire for autarky and self-sufficiency, expressed in the second Four-Year Plan. Again, once it was decided to maintain internal stability of prices and wages, home consumption became automatically stabilized. All these various causes worked in together, and led to the one-sided character of Germany's recovery.

Normally this wholesale creation of bills of a non-self-liquidating character would have led to undisguised inflation, expressed in a rising spiral of prices, wages and costs. Even we in England, with our more conservative methods of finance, were in sight of it two years ago. In Germany this did not happen. First, the volume of inflation, as expressed by the growth in currency and bank deposits, was relatively moderate. Next there was the regulation of prices, wages and consumption, as well as of all capital movements into and out of the country. Then there was the "back-diversion" of the results of inflation, through heavier taxes, the mobilization of savings, limitation of dividends and distributable profits, and so on. Finally there was the continuation and extension of the Government's development programme, so that the

new money never ran ahead of the new demand for it. We are brought back to the basic fact that practically the whole of the additional production was diverted to Government needs, while the balance between the supply of and the demand for credit was kept with a very fair degree of success. But these are very general observations, intended more to provoke a discussion than to supply an answer.

The real question is whether this system can continue indefinitely. I can see no direct economic reason to the contrary, once we realize the existence of a new economic language. I can see several indirect reasons. The first is the psychology of the worker, who is now kept going upon a limited supply of bread and a regular succession of circuses. In time lack of bread may affect his efficiency, while the supply of circuses is not unlimited; nor, if we can judge from Mr. Chamberlain's reception in Munich, are the latest circuses entirely satisfying. In fact, I gather that this deterioration in labour efficiency, due to the over-concentration on capital goods to the exclusion of consumers' goods, is already taking place; and indeed is being accelerated by the necessity of recruiting fresh labour from all possible sources, regardless of the degree of skill of the new recruits. Then planning on a national scale has meant the creation of a large and complex machine, and there is always the danger of minor and local breakdowns which may have a cumulative effect. Again, while the scope for public works is still extremely large, it is not unlimited. Also every fresh extension of plant and machinery increases the volume of obsolescence and necessary replacement. If ever the limit is reached, then either the machine will have to slow down (to the detriment of employment), or planning will have to be directed towards a deliberate expansion of consumption and raising of the standard of living. This will involve an alteration of the present relations between prices and wages, and under Germany's present system this suggests the nightmare nautical manoeuvre of executing repairs while under full steam. Finally there is the question of Germany's needs of imported goods and her economic relations with the outside world. This brings me to the next section of this paper.

Germany : The External Aspect

I shall have failed in my object if it is not already clear that Germany's system of external trade and exchange regulations is both an inevitable consequence and integral part of her internal economic system. A country with practically no gold reserves and a wholly fiduciary currency must regulate the movements of capital across her borders, and also condition her imports by her exports, applying these latter terms to interest and services as well as goods.

A country which is successfully expanding her internal production must, regardless of the character of that expansion, also experience a growing need for those commodities which she does not normally produce at home. This, I suggest, is fundamental.

Quite apart from any desire to extend her political influence, in the economic sphere Germany's objective has been to supply herself with necessary imports from abroad. The Nazi writ does not run beyond the frontiers, nor is the Reichsmark legal tender. Also, as long as she uses what we call normal methods, Germany cannot force other countries to buy her goods. There is no direct or necessary correlation between the growth in German production on the one hand and the growth in German exports on the other hand. Yet some correlation had to be achieved between German production and necessary imports, or the internal programme of expansion would be in peril.

Devaluation, the remedy adopted by many other countries, was ruled out in Germany's case. I have already given two cogent reasons—namely, the memories of the post-war inflation and the fact that devaluation would have destroyed the stability of internal prices, wages and costs. On the other hand, the fact that other countries were one by one devaluing their currencies placed German export trade at least at a temporary disadvantage, for reasons of too general a character to need recapitulation here.

The two main preliminary steps were: first, the strict regulation of capital payments abroad; and second, the determination of imports by exports. The first involved the creation of the whole system of various kinds of blocked marks, a system forced upon Germany by the huge mass of external indebtedness accumulated in the late 'twenties, and which, it is only fair to add, antedate the Third Reich. I cannot see how restriction on capital movements could be avoided, at least for a considerable time to come; and those to whom I have talked (outside Germany) agree with that view, even though they may envisage, and indeed advocate, an ultimate devaluation of the Reichsmark. The fact that present German social and political conditions have forced many Germans, including people of wealth, to take refuge abroad only makes it all the more essential from the Reich's point of view to regulate the efflux of capital. The choice here lies between extreme hardship to the refugee, who on leaving the country is bereft of all his wealth, and the collapse of the country's currency. It is a fresh count in the indictment that people should be forced to leave the country at a time when it is impracticable for them to convert their funds into the currencies of the countries where they take refuge.

Still, the broad fact remains. A country with no gold and a mass of external debts is forced to suspend payment, or at least to

discriminate in such a way as to repay no more than the little it can afford to repay. It is not true that Germany has repaid nothing; but she cannot repay at once all she owes, still less can she grant to her nationals the privilege of investing their savings abroad. Her currency system would not stand that strain, and her people's savings are needed at home.

Coming now to current items, Appendix V contains details of German external trade during recent years. It is clear that neither imports nor exports have kept pace in volume with the growth of internal production, and the discrepancy is so great as to suggest one of the main weaknesses in Germany's economic system. This weakness has only been buttressed by a strict and selective regulation of imports; by special measures to foster exports; and also by a striving after greater self-sufficiency. The last is exemplified in the Four-Year Plan, which finds an additional motive in the memories of the blockade successfully enforced on Germany during the Great War. A further buttress is found in the system of government-organized bulk-buying and exchange clearings, whereby Germany, again with a view to her own needs, is trying to develop her trade with contiguous states to her south-east.

Imports are subject to control by twenty-eight committees, each dealing with a specific group of commodities. These committees decide whether or not exchange is to be allotted. These committees are subject to the control of the Reichswirtschaftsministerium, which in turn has the delicate duty of reconciling the various claims submitted to it from above. Thus the Reichsbank is anxious that the export industries should receive an adequate supply of raw materials. The service or analogous departments press the claims of the rearmament industries, while latterly the Four-Year Plan Office puts in a claim for raw materials needed for the construction and equipment of the new industries in which it is interested. Exactly what goes on behind the scenes in this tug-of-war is, unfortunately, a matter of guess-work. I gathered just enough to realize that this system, or rather its operation, possessed distinct elements of humour.

While imports are controlled, exports are stimulated. The overt argument is that special measures are essential to combat the "depreciation" of foreign currencies. Originally an elaborate system was evolved, whereby exports were financed by allowing the German exporter to sell part of his foreign exchange to an external creditor of Germany, receiving the latter's blocked marks in exchange. This transaction took place at the prevailing rate of discount for the type of blocked marks involved. This had the disadvantage that only part of the proceeds of the exports accrued in free exchange, the other part going to the discharge of out-

standing external indebtedness. The advantage was that the average rate of exchange at which the transaction went through was rather more favourable to the German exporter than if he had been paid entirely in free exchange. In simple language, the foreign creditor received part payment of his debt on condition that he let the other part go as a subsidy to German exports. This system still exists as regards the German tourist traffic, which, as most people know, is carried on in travel marks, largely consisting of registered marks representing the standstill commitments of Germany. Every foreign visitor to Germany is in effect subsidized by a standstill creditor, and registered marks bring in free exchange to the German authorities. (Since the Anschluss, the travel mark consists only partly of registered marks, the balance bringing in free exchange.)

This system was applied to "additional exports," a term which at once calls to mind the American problem of taking inventory of the number of hogs not raised. Additional exports, in fact, were those exports which could not have been made without that special form of subsidy. Traces of this system still remain. In many South American countries trade is mainly conducted in "aski" marks, representing the direct marriage of imports and exports, country by country. Quotations for some of these aski marks, in comparison with the free Reichsmark exchange rate, are given in Appendix VI. Comment on these rates is reserved until the general conclusion of this section.

Apart from exchange clearings, the main buttress is now the direct subsidy to exports. This is levied separately on each industry, and applied to the exports of that industry. The only limit is that the percentage rate of subsidy shall not exceed the percentage depreciation of foreign currencies. This system is simpler than that of praying-in-aid blocked marks and making Germany's creditors subsidize her exports. It also has the merit that the whole of the proceeds of the goods exported are received in foreign exchange. The low level of the German export price index (*vide* Appendices III and V) suggests that this subsidy must be appreciable.

As regards volume, it is interesting to compare that of German exports with that of world trade as a whole:—

	World	Germany (Exports)
1929... ..	134	171
1932... ..	100	100
1933... ..	101.3	93
1934... ..	105.8	86
1935... ..	109	90
1936... ..	115	100
1937... ..	130	117

Germany was slow in joining in the post-depression recovery, and never succeeded in catching up. This may be both the explanation of Dr. Funk's drive this year and an indication that we ought not to be unduly alarmed at it. In explanation of this lagging behind of German export, Germany may be the victim as well as the chief exponent of autarky. I also have a suspicion that from time to time home needs have been allowed to over-ride the needs of her export industries. If, however, these calculations can be regarded as reliable, Germany, with all her drives, has not yet become the formidable competitor which some people fear that she may eventually become.

Probably the system which has attracted most attention is that of the various exchange payments and clearing agreements. There is a sharp distinction between a "payments" agreement and a "clearing" agreement. First, a payments agreement is between Germany and a free-exchange country such as England. Here the sterling proceeds of German exports are "paid in," and the German importer is allowed to "draw out" up to a prescribed proportion of the amounts paid in during a given period (*e.g.*, three months). The margin is available for the discharge of outstanding German indebtedness to Great Britain and for other purposes, as defined in the agreement. A "clearing" agreement is made between two countries both of whom restrict exchange dealings. The exporters on both sides "pay in" and importers on both sides in theory "draw out," accounts being maintained by both countries with their own central banks in their own currencies for the purpose of receiving and making payments.

Mr. Michael Finsbury once observed to Mr. William Bent Pitman that one drunken man was excellent business but two drunken men were all my eye. Where both countries have exchange restrictions and try to operate a clearing agreement between them, it only works so long as imports and exports balance. If not, the debtor country accumulates a large balance in its own clearing account (representing the surplus of its imports), while in the creditor country the exporters whistle for their money. The exporters then begin to bring pressure to bear on their authorities to permit, and indeed encourage, more imports from the debtor country, so that they can get their money for past as well as for future exports. This at once creates an atmosphere favourable to the debtor country, which, indeed, begins to find that running into debt imbues it with new strength.

Sufficient has been published lately regarding Germany's export trade technique to make it unnecessary for me to discuss it in detail (*e.g.*, *The Economist's* Supplement, November 5th, 1938).

Instead I propose to try to view the system in its broad perspective. First I suggest there are four basic points.

(1) Germany needs certain commodities abroad—food, raw materials, perhaps even certain capital goods, if her home development is being forced ahead of her home capacity.

(2) In her external trade, the Third Reich no more thinks in terms of money than in her internal trade. The chief new limiting condition is that her imports and exports must balance sufficiently to prevent her from losing exchange; or, if not, some way round must be found. So long as this condition is fulfilled, money need not matter, and she is able to subsidize imports and/or exports as best suits her book.

(3) The chief object of her export trade is to enable her to buy necessary imports.

(4) It is impossible to consider her external trade policy separately from her external political policy; and in both cases she plans ahead as well as for the immediate needs of the moment.

Her chief objective, then, is to secure the best terms of trade from her point of view—to obtain, and to insure that she will obtain in future, just those imports she needs in return for those exports which she can readily spare. Regarded from this angle, which is the best line of approach—depreciated aski marks, subsidies or political pressure? Obviously it all depends upon circumstances. A country like Brazil is too remote for direct political pressure. On the other hand, she has surplus cotton and coffee, for which Germany has been the only market which can be deliberately expanded for other than strict economic causes. Here the aski mark is the simplest solution. The Brazilian Government welcomes it, for it holds out the attraction of cheap German machinery. It is true that the German importer has to pay more in German Reichsmarks for his cotton or coffee (or else the Brazilian shipper will have to accept less in milreis), but a subsidy to the German importer will solve the problem to the general satisfaction of all concerned. On the other hand, the aski mark without subsidies will not alter the terms of trade. If the milreis value of a piece of machinery equals the milreis value of 1,000 bags of coffee, no juggling with the exchange rate will alter that relation. Either the German sale of machinery or the German purchase of coffee must be subsidized, before a new relation can be established. Again, if the pool of aski marks runs dry, Brazil may suspend sales of cotton or coffee, as actually happened last year. It is true that this suspension was only temporary, but this was because the Brazilian Government has needed fresh German equipment for its own home-development programme.

The use of aski marks, however, has this result. It diverts the need of a subsidy from the exporter of machinery to the importer of cotton or coffee. This may be convenient for independent reasons. In any case the aski mark provides an additional control lever, even if it is not an essential lever.

Appendix V brings to light one interesting fact—namely, that the discount on aski marks has had a tendency to narrow. Originally the aski mark came into existence because it arose out of blocked marks created by previous shipments of South American produce to Germany; and the first discount represented the rate agreed on for the liquidation of this debt. There has since been the world trade revival, which reached its peak in early 1937, and this reduced these countries' dependence upon the German market. Argentina, indeed, never had any truck with aski marks. There is a secret compensation agreement, establishing trade on the bilateral principle, but the basic rate is the official rate for imports subject to prior import permits. But in any case the narrowing of the discount is of no significance to Germany. It only calls for a corresponding adjustment of the various subsidies.

Countries of Central and South-Eastern Europe are contiguous to Germany, and so political and other forms of pressure can be readily employed. Two additional levers ought here to be mentioned. The first is the political power in many of these countries of the agrarian element which finds in Germany the chief market for its produce. The second is the indirect ownership of Germany in some of these countries' industries—ownership exercised through subsidiary companies, banking participation and similar devices. In fact, I go so far as to say that exchange clearings, for all the attention which they have attracted, are no more than one particular part of Germany's new external trade machine.

It is now easy to see the general lines on which Germany can work.

(1) She can force contiguous countries to take such goods as she chooses to sell them, for otherwise she will be "unable" either to pay debts incurred for past imports or to import more; and the threat induces the agrarians and other exporters in these countries to bring the requisite pressure to bear on their Governments.

(2) She can also adjust subsidies so as either to pay the top price for desirable imports, or to offer her own goods at prices below the world level.

(3) She can import in excess of her own needs. The surplus can be re-sold in the world's markets for "free exchange," at prices below the world level. The price itself is immaterial to her, compared with the opportunity of receiving free exchange. Moreover,

by knocking the bottom out of the world market, she can increase her hold over the original sources of supply.

(4) She can use external industries under her control to supply her own particular needs. For all practical purposes they are part of her internal industrial system. And there are devious ways of overcoming any resulting exchange difficulties, or rather in turning them to her own advantage.

In short, she has devised means of extending her own concept of money, as described in the previous section of this paper, beyond her boundaries. She is, in fact, creating a "Reichsmark-area" analogous to the sterling area, but under her economic control.

Nevertheless we cannot dismiss this system of international trade as ephemeral. Whatever we think of Germany's methods, she must be able to trade abroad. Nor can we ignore the fact that certain countries must look to Germany as their chief market, just as others look to Great Britain or the United States. It is, in fact, another example of that economic discontinuity, to which I alluded in the introduction to this paper. If we want to retain our share of those markets, we must break through that discontinuity, even if in some respects we may have to take a leaf out of Germany's book, and arrange to buy on a national scale and to finance our purchases on a national scale. But if we seek to deny to Germany those raw materials and goods which she legitimately needs, I do not see how we can complain of the economic and political consequences.

Conclusion

I have tried to give my impression of the German economic and financial system as I saw it at the end of 1937, and modified to some extent by more recent conclusions. In effect, it is a practical application of Socialism, consisting of large-scale planning and execution under the guidance, leadership and control of the central authority. The German economic system is definitely dependent upon her internal political and social system. It is equally conditioned by Germany's determination to rearm and by certain external political desires, such as her efforts to absorb all German-speaking people within her boundaries and her desire to extend her political influence in Central and South-Eastern Europe. Even her desire for colonies has an economic as well as a political background.

The first question is, quite apart from politics, Can this economic system exist and develop permanently? From Germany's point of view it has had a successful short run, though mainly during a time of world-wide recovery. Is this sufficient proof that it will succeed in the long run? I have previously voiced certain doubts some of

which are stronger to-day than they were a year ago. My next question is whether, to put it bluntly, an economic system of this kind can be combined with a reasonable attitude to non-members of the Party at home and to neighbouring countries abroad. At the moment I can see no reason to the contrary, but it is a question of some importance to us all.

This raises the next question. How can an economic system of this kind work in harmonious conjunction with the older concepts such as exist in many other countries, including our own? On the purely monetary side it appears that Germany is trying to get the best of both worlds. She eschews devaluation with its attendant rise in the price of imports. Yet she gains for her export trade the benefits of devaluation, through her system of export subsidies, aski marks, exchange clearings, and so on. But is this necessarily in itself an unneighbourly policy? The answer may well be that her exchange devices are all so much scaffolding, while the real secret lies in her power as an important industrial and commercial nation, operating under a system of national planning and able to import and export as a single large-scale national unit. Her own predominance, both as buyer and seller, may well be the real driving-force behind her monetary devices. If she had chosen the alternative path of devaluation and free exchange, this driving-force might still be equally effective.

Nor can we blame Germany for seeking to expand her external trade. Some of her objects and methods may be open to criticism—her insistence on rearmament, her combination of economic expansion with political hegemony. But in itself economic expansion is not necessarily bad. Any growth in trade in both directions between Germany and her neighbours ought *prima facie* to be welcomed as adding to the wealth of all concerned. It is not the expansion but the direction and distortion of this expansion to serve other ends of Germany which in themselves arouse misgivings. The real tests are whether this development of Germany's internal trade adds to the well-being of the German people; and, above all, whether Germany's neighbours get the goods which they really need, or whether they simply have to take under pressure what is offered to them regardless of whether they need it or not. There is evidence that these tests have not been fulfilled. Is this the fault of the system or its *modus operandi*?

And so, too, with colonies. There is an economic motive behind Germany's demand for colonies, and it would be a legitimate economic motive. Germany needs tropical produce—oils, fats, metals, fibre and so on. She wants to be able to pay for them in Reichsmarks: that is, to pay for them by her own exports—also by development

work undertaken with German capital, technicians and materials. There is, of course, the answer that Germany is free to export to those territories to-day, though she does not and ought not to have a monopoly of those territories' export trade. But German development is in practice ruled out so long as those territories are not under German ownership. I do not, however, stress this any further, as the answer to Germany's demand for colonies does not depend upon economic considerations.

I end on a further questioning note. For purposes of discussion, I ask whether the German economic system is by itself necessarily either unneighbourly or unsound. Many of our doubts arise because it is combined with political and social manners and customs which do not commend themselves to our own traditions, beliefs or sense of what is right and wrong. Let us envisage a new Germany, purged of all oppression and aggression, and willing to respect her neighbours and to join in universal disarmament. Can we also assume that that new Germany could maintain the economic system which she has evolved under the Third Reich, and would also be willing and able to operate it in a spirit of co-operation with her neighbours? That is one of the points which we ought to be thinking out to-day. For if we decide that we can make that assumption, then we can concentrate on the next and more important problem of how to make liberal and totalitarian economics work side by side. Admittedly I am setting up an ideal, and admittedly the first condition of its attainment is a complete change of spirit in Germany or rather in her rulers. But it will increase the chance of such a change in spirit coming about, if in the meantime we consider this problem on a strictly objective and scientific economic plane, ridding our minds of the prejudice that inevitably exists in them to-day, and discriminating between the legitimate and illegitimate needs of Germany and of other countries as well. In presenting to-night this very cursory and incomplete picture of German economics under the Third Reich, my real hope is to evoke a discussion which will provide some guidance and open up some fresh lines of thought towards the solution of this problem.

APPENDIX I

COMPARISON OF GERMAN, BRITISH AND AMERICAN BANKING

CENTRAL BANKS

Reichsbank (Rm. millions)

Dec. 31	Gold and Foreign Exchange	Bills	Investments	Note Circulation	Deposits	Other Liabilities
1929	2,687	2,849	92	5,044	755	736
1932	920	2,807	398	3,560	540	1,313
1933	395	3,226	581	3,645	640	836
1934	84	4,076	764	3,901	984	1,001
1935	87	4,551	664	4,285	1,032	923
1936	72	5,510	524	4,980	1,012	953
1937	77	6,132	392	5,493	1,059	970
1938						

Bank of England (£ millions)

Nov.	Gold	Fiduciary Note Issue	Government Securities	Note Circulation	Public Deposits	Bankers' Deposits
1929	135	260	58	355	17	58
1932	139	275	69	359	10	90
1933	191	260	71	370	14	107
1934	192	260	80	380	28	89
1935	198	260	85	401	20	91
1936	249	260	78	446	20	98
1937	326	220	79	486	21	106
1938	326	200	90	481	23	97

U.S. Federal Reserve Banks (\$ millions)

Nov.	Gold (or Gold Certificates)	Bills Bought or Re-discounted	Government Securities	Note Circulation	Member Bank Deposits	Of which "Excess"
1929	2,987	1,170	326	1,930	2,376	—
1932	3,049	341	1,851	2,692	2,411	—
1933	3,576	132	2,431	2,973	2,687	—
1934	5,112	16	2,430	3,214	4,073	27
1935	7,410	10	2,430	3,648	5,905	3,180
1936	8,811	9	2,430	4,203	6,775	2,210
1937	9,122	20	2,564	4,279	6,907	1,120
1938	11,602	8	2,564	4,385	8,876	3,380

COMMERCIAL BANKS
Germany (Rm. millions)

End of	Creditors (Deposits)	Cash	Discounts	Investments	Debtors (Advances)
1929	21,753	720	4,918	1,150	11,227
1932	14,694	444	3,349	1,485	9,005
1933	14,787	438	4,099	1,545	8,670
1934	16,009	463	5,396	2,453	8,193
1935	14,920	514	5,855	2,905	7,015
1936	15,881	267	7,001	3,227	6,725
1937*	16,592	384	7,717	3,406	5,971

* August.

U.K. (£ millions)

Nov.	Deposits	Cash	Call and Short Money	Discounts	Investments	Advances
1929	1,789	190	144	233	249	990
1932	1,898	193	116	391	425	785
1933	1,928	216	99	317	569	737
1934	1,911	210	135	232	589	755
1935	2,039	214	147	293	621	774
1936	2,210	225	172	322	626	863
1937	2,231	227	151	293	604	956

U.S.A. (\$ millions)

End Nov.	Deposits		Balances at Reserve Banks	Loans	Investments
	Demand	Time			
1929	—	—	—	—	—
1932	11,584	5,694	—	10,343	8,604
1933	10,629	4,472	—	8,557	8,124
1934	13,563	4,422	3,331	8,161	10,750
1935	13,819	4,872	4,754	8,002	12,488
1936	15,464	5,034	5,431	8,779	13,622
1937	14,655	5,273	5,394	9,479	11,953

Changes since 1932 (Central Banks)

	Gold *			Note Circulation			Bankers' Deposit		
	Germany	U.K.	U.S.A.	Germany	U.K.	U.S.A.	Germany †	U.K.	U.S.A.
1929	292.0	97.1	98.3	141.7	98.9	71.8	139.8	64.4	98.5
1932	100	100	100	100	100	100	100	100	100
1933	42.9	137.5	117.7	102.2	103.2	110.5	119.8	118.9	111.6
1934	9.1	138.1	168.3	109.5	105.8	119.4	182.1	98.9	168.8
1935	9.4	142.7	244.0	120.2	111.7	135.2	191.0	101.1	245.3
1936	7.7	179.2	290.0	139.7	124.3	156.3	187.5	108.9	281.0
1937	8.4	234.2	299.8	154.2	135.3	159.0	195.8	117.8	286.5

* Only gold held in central bank.

† Not shown separately. Index relates to "deposits" generally.

Changes since 1932 (Commercial Banks)

	Deposits			Cash		Discounts		Investments			Advances		
	Ger.	U.K.	U.S.A.	Ger.	U.K.	Ger.	U.K.	Ger.	U.K.	U.S.A.	Ger.	U.K.	U.S.A.
1929	148.2	94.3	—	162.1	98.4	146.9	59.6	77.4	58.5	—	124.8	126.1	—
1932	100	100	100	100	100	100	100	100	100	100	100	100	100
1933	100.7	101.6	87.5	98.6	111.8	122.2	81.0	104.1	133.8	94.3	96.2	93.8	82.8
1934	109.2	100.8	104.2	104.2	108.8	161.2	59.4	165.1	138.5	124.8	90.8	96.2	78.8
1935	101.8	107.3	108.3	115.6	111.9	174.8	74.8	195.8	146.2	144.8	77.8	98.6	77.4
1936	108.3	116.5	118.8	60.2	116.7	209.2	82.3	217.5	147.2	158.3	74.6	109.8	84.8
1937	113.2	117.6	115.4	86.4	117.7	230.4	74.8	229.5	142.0	150.3	66.3	121.7	91.8

APPENDIX II

Reich Tax Revenue (Rm. millions)

Year (to March 31st)	Reich Tax Revenue		National Income	Ratio of Gross Revenue to National Income %
	Gross	Net *		
1929-30	9,172	5,879	76,000	12.1
1932-33	6,647	4,925	45,000	14.8
1933-34	6,846	4,956	47,000	14.6
1934-35	8,223	5,728	53,000	15.5
1935-36	9,654	7,064	57,000	16.9
1936-37	11,492	8,881	62,000	18.5
1937-38	13,500 †	10,900 †	68,000	19.9

* After deducting the Reich's contribution to the Provinces.

† Estimated.

*Reich National Debt**Disclosed Reich Debt* (Rm. millions)

March 31st	Internal Debt			External Debt
	Funded	Floating	Total	
1929	7,071	990	8,061	877
1932	7,724	1,722	9,446	2,706
1933	7,775	1,948	9,723	2,621
1934	8,416	2,188	10,604	1,811
1935	8,315	2,487	10,802	1,730
1936	9,830	2,918	12,748	1,698
1937	12,268	2,383	14,651	1,480

Comparison of British and German Tax Revenue

	Great Britain		Germany	
	£ millions	Index	Rm. millions	Index
1929-30	654.7	92.8	9,172	138.2
1932-33	704.7	100	6,647	100
1933-34	683.5	96.8	6,846	102.8
1934-35	683.4	96.8	8,223	123.8
1935-36	713.2	101.2	9,654	145.2
1936-37	783.1	110.8	11,492	173.0
1937-38	841.3	119.5	13,500	203.2

APPENDIX III

Wholesale Prices

	Wholesale Prices			Agricultural Products Prices	Germany, Finished Goods Prices	Average Price	
	U.K.	U.S.A.	Germany			Imports *	Exports *
1929	145.5	156.2	142.3	146.8	133.8	201.6	136.8
1932	100	100	100	100	100	100	100
1933	100	104.8	96.7	94.8	95.7	89.8	90.8
1934	102.7	124.3	101.8	104.8	98.2	91.8	84.8
1935	104.2	134.8	105.3	111.8	101.3	91.2	81.7
1936	112.2	135.8	107.7	114.8	102.9	98.2	83.2
1937	129.8	147.2	109.7	115.3 †	106.5 †	111.2	88.2

* June of each year.

† September, 1937.

Cost of Living and Wages

	Cost of Living	Money Wages		Real Wages	
		Per Month	Per Hour	Per Month	Per Hour
1934	100	100	100	100	100
1935	101.6	104.3	103.1	102.6	101.4
1936	102.8	108.8	105.1	105.8	102.3
1937 (March)	103.2	113.2	107.4	109.7	104.1

APPENDIX IV

	Production			Employment	
	General Index	Coal	Steel	Number Employed (number millions)	Index
1929	187.8	153.2	281.3	17.86	143.0
1932	100	100	100	12.49	100
1933	113.8	104.3	132.8	13.07	104.5
1934	149.9	117.8	206.5	15.10	120.8
1935	176.2	133.2	280.0	15.97	127.9
1936	209.3 *	146.3	317.5	17.67	141.3
1937	220.6 †	163.3 ‡	338.5	18.5 ‡	148.2

* December. † June. ‡ First quarter.

Employment in Various Industries
(in thousands)

	1933	1936	Percentage Increase
Mining	420	485	15.5
Building Materials	214	331	54.7
Building	666	2,057	208.9
Iron and Steel	261	337	44.4
Machinery	311	641	106.1
Railway Construction	148	321	116.9
Chemicals	178	238	33.7
Textiles	694	798	15.0
Timber	252	331	31.3
Food	506	535	5.7
Clothing	401	454	13.2

APPENDIX V

GERMAN EXTERNAL TRADE

(Rm. millions)

	Imports	Exports	Balance
1929	13,447	13,483	+ 36
1932	4,666	5,739	+ 1,073
1933	4,204	4,871	+ 667
1934	4,451	4,167	— 284
1935	4,159	4,270	+ 111
1936	4,218	4,768	+ 550
1937	5,477	5,920	+ 443

GERMAN EXTERNAL TRADE. INDICES

(1932 = 100)

	Value		Price		Volume		Internal Production
	Imports	Exports	Imports	Exports	Imports	Exports	
1929	288	235	202	137	142	171	188
1932	100	100	100	100	100	100	100
1933	90	85	90	91	100	93	114
1934	96	73	92	85	104	86	150
1935	89	74	91	82	98	90	176
1936	91	83	98	83	93	100	209
1937	117	103	111	88	105	117	221

U.K. EXTERNAL TRADE

(£ millions)

			Imports.	Exports	Balance
1929	...	...	1,111	729	—382
1932	...	...	651	365	—286
1933	...	...	627	367	—260
1934	...	...	680	396	—284
1935	...	...	702	426	—276
1936	...	...	787	441	—346
1937	...	...	954	522	—432

BRITISH EXTERNAL TRADE. INDICES

(1932 = 100)

	Value		Price		Quantity		Production
	Imports	Exports	Imports	Exports	Imports	Exports	
1929	171	200	145	120	118	167	120
1932	100	100	100	100	100	100	100
1933	96	100	94	98	102	102	106
1934	104	108	97	98	107	110	117
1935	108	117	100	98	108	119	125
1936	121	121	104	100	116	121	137
1937	147	143	119	101	124	142	147

U.S. EXTERNAL TRADE

(\$ millions)

			Imports	Exports	Balance
1929	...	...	4,339	5,241	+902
1932	...	...	1,325	1,611	+286
1933	...	...	1,433	1,675	+242
1934	...	...	1,636	2,133	+497
1935	...	...	2,037	2,283	+244
1936	...	...	2,424	2,456	+ 32
1937	...	...	3,010	3,349	+339

U.S. EXTERNAL TRADE. INDICES

(1932 = 100)

	Value		Price		Volume		Production
	Imports	Exports	Imports	Exports	Imports	Exports	
1929	332	326	202	171	166	191	186
1932	100	100	100	100	100	100	100
1933	106	106	100	106	109	100	119
1934	109	134	116	123	109	107	124
1935	127	143	116	127	134	113	141
1936	156	154	126	129	149	119	166
1937	233	212	140	137	166	152	172

APPENDIX VI

BRAZIL

(milreis per mark)

	Ask mark	Reichsmark	Discount
October 31st, 1935 ...	\$5 576	\$7 100	21.4%
March 19th, 1936 ...	\$5 400	\$7 250	25.5%
October 27th, 1936 ...	\$5 300	\$6 850	22.6%
March 31st, 1937 ...	\$5 200	\$6 520	20.2%
October 27th, 1937 ...	\$5 600	\$7 115	29.7%
March 3rd, 1938 ...	\$5 825	not quoted	—
October 26th, 1938 ...	\$5 980	\$7 130	16.2%

CHILE

(pesos per mark)

	Compensation Marks	Reichsmark	Discount
June 23rd, 1936 ...	7.80	10.48	25.6%

It is difficult to trace later rates, but the majority of trade with Germany is transacted in compensation marks, and the quotation for the Reichsmark is either normal or does not exist.

COLOMBIA

(pesos per mark)

	Ask mark	Reichsmark	Discount
October, 1935 ...	58.22	70.28	17.2%
July, 1936 ...	55.50	70.72	21.5%
October, 1936 ...	60.25	not quoted	—
October, 1937 ...	57.85	70.62	18.3%
October, 1938 ...	57.85	68.70	16.0%

PERU
(soles per 100 mark)

	Aski mark	Reichsmark	Discount
October, 1935	160.50	121.00	24.6%
March, 1936	118.25	161.61	26.8%
October, 1936	118.50	165.18	28.2%
March, 1937	118.50	156.50	24.4%
October, 1937	125.50	160.79	21.8%
March, 1938	133.50	not quoted	—
October, 1938	151.00	187.75	19.5%

URUGUAY

Under the Uruguayan-German Trade Treaty, the import rate is Rm. 1.60 to the peso, whereas the normal cross-rate (through sterling) is Rm. 1.421. The export rate is Rm. 1.809, whereas the cross-rate works out at Rm. 1.607. The actual rate is thus at a discount of 11.2 per cent. Exchange emanating from Uruguayan exports to Germany is credited to a special account in the Reichsbank, and applied to pay for German exports to Uruguay.

APPENDIX VII

EXTERNAL TRADE OF CENTRAL AND SOUTH-EASTERN EUROPE

(Rm. millions)

Total Trade	CZECHOSLOVAKIA		HUNGARY	
	Imports	Exports	Imports	Exports
1929	2,479	2,547	779	761
1932	930	914	180	183
1933	725	730	165	207
1934	661	756	173	203
1935	694	765	182	204
1936	782	792	196	229
1937	953	1,038	230	285
Trade with Germany				
1929	622 (25.1%)	493 (19.3%)	156 (20%)	89 (11.7%)
1932	245 (26.3%)	148 (16.2%)	40 (22.5%)	28 (15.1%)
1933	150 (20.6%)	130 (17.8%)	32 (19.4%)	23 (11.1%)
1934	128 (19.3%)	162 (21.2%)	32 (18.5%)	45 (22.2%)
1935	119 (17.2%)	120 (15.7%)	42 (22.7%)	49 (23.9%)
1936	137 (17.5%)	113 (14.3%)	51 (25.8%)	53 (23.1%)
1937	147 (15.5%)	142 (13.7%)	60 (26.2%)	69 (25.5%)

Total Trade	JUGOSLAVIA		ROUMANIA	
	Imports	Exports	Imports	Exports
1929	561	585	740	724
1932	191	207	289	421
1933	151	180	292	353
1934	198	218	329	340
1935	204	228	270	417
1936	225	248	289	484
1937	293	357	328	568
Trade with Germany				
1929	88 (15.6%)	50 (8.5%)	178 (24.1%)	200 (27.6%)
1932	34 (17.9%)	23 (11.3%)	71 (24.5%)	52 (12.4%)
1933	20 (13.2%)	25 (13.9%)	54 (18.5%)	37 (10.5%)
1934	28 (14.2%)	34 (15.6%)	51 (15.5%)	56 (16.5%)
1935	33 (16.0%)	43 (18.7%)	64 (23.8%)	70 (16.7%)
1936	60 (26.8%)	59 (23.7%)	107 (37.0%)	92 (19.0%)
1937	96 (32.4%)	78 (21.7%)	98 (30.8%)	114 (20.2%)

Total Trade	GREECE		TURKEY	
	Imports	Exports	Imports	Exports
1929	722	379	519	314
1932	281	164	174	205
1933	201	123	149	193
1934	214	133	172	184
1935	251	167	174	190
1936	278	174	183	233
1937	358	225	273	226
Trade with Germany				
1929	68 (9.6%)	88 (23.2%)	79 (15.3%)	42 (13.3%)
1932	27 (9.7%)	25 (15.1%)	40 (23.2%)	28 (13.5%)
1933	21 (10.4%)	22 (17.9%)	38 (25.5%)	36 (18.7%)
1934	31 (14.5%)	30 (22.6%)	58 (33.6%)	69 (37.4%)
1935	47 (18.7%)	50 (29.7%)	70 (40.3%)	77 (40.9%)
1936	63 (22.6%)	63 (36.4%)	83 (45.1%)	119 (51.0%)
1937	97 (27.2%)	70 (31.0%)	95 (42.1%)	100 (49.2%)

DISCUSSION ON MR. CRUMP'S PAPER

MR. R. G. HAWTREY (speaking in a personal and non-official capacity) had pleasure in proposing a vote of thanks to the author of this paper. Mr. Crump had started with the thesis that the Third Reich had embarked on a new economic policy. In certain respects all were agreed that that was so, but perhaps the particular aspects of it that he referred to were not so novel as he suggested. In the first place, Mr. Crump had said that in Germany the unemployed were regarded as a reserve for national production. That was one of Marx's accusations against the capitalist system. But surely it was an accusation that applied less to Germany than to almost any other country in the world at the present time. Germany had had a "reserve" of labour of six million, and had reduced it to 100,000. Mr. Crump had said that another novelty was to treat money as a medium of exchange rather than as a store of value. To discuss the exact relative weight of the two uses of money in different countries would be a waste of time, but there was certainly no great novelty about it.

The most striking fact about German economic experience in the last five years had been the elimination of unemployment. Mr. Crump had raised the question whether there had been inflation. Some years ago the late Sir Basil Blackett (Mr. Hawtreys thought it was he) introduced the term "reflation" to describe the process by which a monetary expansion was employed, not to raise prices and increase the other evils commonly arising out of inflation, but to absorb surplus productive capacity. Mr. Crump, in fact, used the word. That was the process which, all over the world, we had been intent upon during the last few years, and had failed in large measure to attain. In Germany it had been attained. In the early days of the depression, a year or two before the National Socialist régime began, the system of deliberately promoting inflation by issuing bills to employers who were prepared to employ additional labour had been adopted. It was quite definitely and almost avowedly inflation in purpose and effect, but at the time the Germans were desperately afraid of a reversion to the disasters of inflation of the years 1919-23. Consequently, concurrently with this measure, they imposed a severe exchange control, the effect of which was to prevent the fall of the gold value of the mark. It worked in this way, that in the first instance the export industries were let go; they were exposed the first year or two to the full blast of the fall in the world price level. At the same time, the limitation of imports to what exports would pay for, and the limitation of the payment of external liabilities with the same object in view, had the effect of maintaining the quoted rate of exchange and, of course, creating a scarcity and a rise in price of all the goods that compete with imports, with a violent distortion of the price level. Under those conditions it was possible to indulge in any degree of inflation, however great, without upsetting the rate of exchange, provided that the exchange control was effective, and that a country was prepared to scrap the export industries.

As regards making the exchange control effective, Germany was completely successful. Whether under the Weimar Republic it would have been equally successful was not certain. The totalitarian system introduced a stiffer discipline, and had the effect of reinforcing official regulations by pressure from the National Socialist Party. The system had been rigorously enforced and discipline had been maintained. On the other hand, there had been the difficulty about the exporting industries. There had been more than one line of approach towards that. In the first place, there was an important fact which Mr. Crump seemed to have omitted from his statistical survey, namely, that in the period from 1929-33 there was a very heavy fall of wages; his statistics of wages started with 1934. Money wages in Germany at the present time were about 22 per cent. less than they were in 1929. That by itself was far from being enough to rectify the position of the exporting industries. As Mr. Crump pointed out, a number of devices were resorted to to subsidize exports—ordinary subsidies, devices whereby exporters were permitted to buy in foreign centres German bonds which were quoted at a much lower price abroad than in Germany, and to use the difference as the equivalent of a subsidy, and, finally, this rather elaborate clearing system which again afforded a hidden subsidy to exports.

Mr. Crump did not appear to make the character and extent of the subsidy quite clear in his paper. As between two countries which both have exchange control, in either case imported goods were raised above world price level, just as they would be by a high protective tariff. But there was no duty to be paid representing the difference, and any one who could get permission to import received a privilege the value of which was represented by the difference between the price in the country concerned and the world price. Two such countries could afford to open their markets to one another's exports, and the exporter in each country got the benefit of the artificial price in the import market of the other. That process enabled all the countries with exchange restrictions to trade with one another in preference to countries with free exchanges. The system, then, resulted in a subsidy to exports.

A subsidy to exports combined with a system of restriction or duties upon imports was really, for the purposes of international exchange, equivalent to a depreciation of the currency unit. An interesting reference to that point appeared in one of the Addenda to the Macmillan Committee's Report in 1931. It is pointed out in that addendum, signed by Mr. Keynes, Mr. McKenna and two or three others, that a subsidy on exports combined with an equivalent duty on imports had precisely the same effect as depreciation of the currency so far as concerned trade in commodities; of course it had not the same effect on financial obligations between the country and foreign countries. That is the device by which the Germans had succeeded in relieving, though not in altogether annulling the adverse effects of the high value of the mark on their export trade. That and the reduction of wages appeared to be the fundamental factors in that connection.

The Germans were in the position of having used up their reserves of unemployed. The country was now suffering severely from a scarcity of labour. It had wakened up from the strange dream in which the greater part of the world was still wandering—the dream that there could be no scarcity of productive power. We had only to get back to normal economic conditions to have the same experience in England, America, and everywhere else. The normal state of a country with a healthy and properly working monetary and credit system was one in which you could both eat your cake and have it.

MR. BARNARD ELLINGER, after seconding the vote of thanks to Mr. Crump, said that he wished to refer particularly to problems relating to the part of this interesting paper which was concerned with external trade, but first he would ask for enlightenment on one point. Mr. Crump had said that the system of Special Bills was an ideal system for supplying the Government with an unlimited amount of finance. Mr. Ellinger, however, understood that Germany had given up that system, and found it difficult to understand why they should have done so if it were an ideal system.

As regarded external trade problems, did not Germany's difficulties arise to an enormous extent from the fact that she had never revalued the currency after 1931 and brought it into alignment with the currencies of the other chief industrial nations of the world? The world was not prepared to pay Germany for her goods the equivalent of £1 for 12 marks' worth of goods when her former equivalent and the equivalent in alignment would be something in the neighbourhood of 18 or 20 marks' worth. Therefore she had adopted all kinds of subterfuges to meet this position; some of them were not new, but they were very ingenious. If she had devalued her currency, the first result would have been that she would provide a general subsidy for all the producers of exported goods at the cost of all the consumers of imported goods, and in a free economy that position would gradually right itself, until she was once again in alignment with the rest of the world. But she had adopted a system of creating different kinds of marks based on different considerations and used for different purposes, but used in the main to give special subsidies in some form for special exports, and even for special transactions. That was a position that the rest of the competitive world must find very difficult to meet. It would meet it, if it continued sufficiently long, by some measures of anti-dumping legislation.

The creation of these different kinds of marks was not really very new. It recalled the chaotic condition of the Chinese currencies up to thirty years ago. When the speaker was in China he got one rate of exchange for what they called "big money," another for what they called "little money," and at one time there was one rate of exchange for the chit which one gave to the rickshaw coolie, and another for the payment of customs duties or for purchases in shops.

The third measure—probably the most dangerous measure—Germany had adopted under her clearing agreements, was one which again she did not invent—namely, to give differential rates of exchange

to different countries. That is not new, because after 1931, when the French and Swiss hotels found that British travellers would not visit them any more owing to the height of the hotel bills, instead of reducing the price for their rooms, they gave visitors to their hotels differential rates of exchange for that purpose. That was the system Germany had adopted, and by that means she was hiding the changes which ought normally to take place by an alteration in prices. By leaving the prices alone and making the alteration by means of rates of exchange arranged between Governments, the system worked to the detriment of competitive countries which had not adopted similar measures. An example was the agreement which Germany had just concluded with Rumania, which fixed the rate of the Rumanian lei at $40\frac{1}{2}$ to the mark. The official rate of exchange with Britain was 660 lei to the £, but there were higher rates for unofficial lei. If you have 12 marks to the £ and 660 lei to the £, in a free arbitrage of exchange rates the German mark would be worth 55 lei, but the two Governments had arranged that it should be worth $40\frac{1}{2}$ lei, so that for $40\frac{1}{2}$ lei the Rumanian importer can now buy German goods for which, if he bought them in England, he would have to pay 55 lei. That would appear to work in exactly the same way as if Rumania were to put a differential tariff against British as compared with German goods. This method of trading between two different countries, by fixing rates of exchange which acted differentially between one country and the other, was contrary to the spirit of the most-favoured-nation clause, and means should be found to counteract it by those countries which were suffering.

On the general question of inflation Mr. Crump told us that the Germans said there could not be inflation because prices had not risen. Possibly in saying that prices had not risen the meaning was not to be taken as prices for exactly the same things. In this country in our home trade we had had for many years a system by which, when prices would normally rise for certain articles, such as ladies' wear, which had more or less a customary price, instead of the manufacturers and shopkeepers putting up the prices, they reduced the quality. If, for example, artificial silk stockings were sold customarily at 1s. 11d. a pair, and the raw material went up to an extent that would bring the price to the customer to 2s. 1d., the equivalent of 2d. would be taken out of the quality of the stockings, and they would still be sold at 1s. 11d. Probably, when it was said of a great many German articles that the price had not altered, it was because the quality of those articles had been lowered.

On the question of how long this system could last and how far it was true that there was no unemployment in Germany, it was possibly worth while reminding them of the remark recently made by Dr. Ley, the head of the German Labour Front—that there were still to-day hundreds of thousands of people unemployed, only they did not realize it, and other people did not notice it. According to Dr. Ley, these “unemployed” persons were busy at some utterly useless task, and should be removed from it and put to something of national importance—for instance coal mining. He said that to-day, if one wanted to build even a little cottage in Germany, it

was necessary to fill up forms 15 yards long and submit them to a succession of superfluous officials.

Then, Dr. Schacht said, "I once called my new plan a horrible thing, and I still stick to that description." He said that an exporting merchant at an exhibition decorated his stand with the forty or so forms which an exporter had to fill up to-day in order to do business.

The breakdown of the German system when it came would perhaps come because the organisation had grown top-heavy. In a life of some length, Mr. Ellinger had seen from time to time the rise of many company promoters. They were wonderful. They discovered new means of promoting companies. They poured scorn on the old issuing houses. But many of them finished up in gaol. And many gamblers, who gambled for big stakes, had "infallible" systems, would break the banks at Monte Carlo and elsewhere, but finished up in the workhouse. There might be things in the German economy which we could imitate, but we had better wait for a decade and the full completion of a trade cycle before we tried to select whatever might be good in that system.

[The vote of thanks was put from the chair and carried unanimously.]

MR. T. BALOGH said that he was sorry that Mr. Crump had only included statistics of the period 1933-37 in his paper. The reasons he had given for not bringing them up to date and not analysing them did not seem quite convincing. He was perhaps led by the fairy "Wishfulfilment," and perhaps he did not want to look too closely for the answers to the questions which he had posed in the last part of his paper. These questions could be, and had been, answered.

The banking statistics for Germany, Great Britain, and America were not, Mr. Balogh thought, really comparable. The German statistics included not only commercial banks, but also other institutions holding savings deposits and deposits confiscated ("blocked") from foreigners and others.

The trade statistics quoted in the appendix were German statistics in terms of Reichsmarks (though Mr. Crump omitted to quote), converted at the clearing rate of exchange or at the German official quotation. They were, therefore, distorted.

The budget estimates in the text of the paper contradicted the data on the national debt given in the appendix. The figures for the increase of debt as given by Mr. Crump for the years 1935-36 to 1938-39 were Rm. millions 1,900, 1,900, 1,900, and 3,000 for each year respectively. According to the appendix they should be 1,900, 1,900, 3,100 and over 9,000. The figures in the appendix were correct. Most of the conclusions were vitiated by these very considerable discrepancies. German armaments expenditure was still growing and, according to official statistics, extremely rapidly. Again, Mr. Crump's figures, so far as the surplus of the unemployment fund was concerned, were not identical with the official figures, which were lower in the beginning and much higher later on. The method of

his calculation was unclear and not supported by any evidence. A method of calculating State expenditure had been evolved by the Germans themselves and could be easily obtained in recent published speeches of several high officials of the Nazi régime. There was no need therefore (and hardly any justification) for guessing these vitally important data.

When Mr. Crump said that he did not know how much the amount of special bills was, and proceeded to make a calculation about armament expenditure, he forgot that at the beginning of the present régime most German bills were private bills, a fact stressed several times by the League of Nations Monetary Review, and these bills were liquidated and replaced by the special bills. Hence in calculating the total amount of the short-term debt we must allow for this "replacement." On the basis of the method adopted by certain official German sources themselves the amount at the disposal of the State for extraordinary expenditure could be estimated at about 2.75; 4.75; 7.4; 9.57; 13.44 and 19 to 23 milliards of marks, *at least*, in the budgetary years 1933-34 to 1938-39, respectively.

If an analysis of the German system proceeded from this basic point it would show that it was increasingly a collectivist war economy, calculated to mobilise all productive factors available for the purpose of creating in the shortest possible time armed forces of a maximum striking power. Mr. Balogh did not think that the provision of useful work or anything of that sort entered into the problem at all. At the beginning of the system, when the detailed plans for rearmament had not yet been prepared, they were not keen to get labour into the labour market. On the contrary, only when rearmament began were the Nazis intent to increase the supply of labour.

He concluded that the present economic tension in Germany was not the consequence of any economic misadventure or mistakes; it had nothing to do with the economics of the Nazi system itself, any more than autarky had anything to do with the system as such. It was the consequence of a deliberate policy of continuously and rapidly increasing military expenditure, which could have been reversed at any time. A reversal of this policy would bring immediate relief to the international economic position of the country and would result in an increase of the standard of life. The fact that the Munich settlement was not followed by such a reversal of policy was sinister and precluded such facile optimism as exudes from the questions put by the lecturer in the last part of his paper. In 1934, when public works programmes were still divided more or less between military and civil projects, Mr. Crump's analysis might have been justified, but those years were eaten by the locusts, and observers in other countries ought not to have *now* any difficulty or diffidence in making up their minds about the present trends. The evidence was available. Scientific objectivity did not mean that you must or ought to call a bayonet a spade. Scientific objectivity was not obtained even by calling it a bloody shovel to mark rural indig-nation. It remained a bayonet.

MR. GLENDAY said the assumption was commonly made that the present German economic system must break down, and that, from the point of view of the world at large, it was to be hoped that it would break down. He was referring to the economic aspect only. He personally doubted whether it would ever have been possible for Germany to have recovered along the old lines under the conditions of the post-war world, or whether a real breakdown of the new system would do any one any good. He raised that point specifically in connection with the present paper because Mr. Crump sought to analyse and estimate the results of the German experiments in terms of traditional economics, whereas an examination of the German system revealed that it was founded on principles entirely different from those which actuated our own. It started off, for example, with the idea that the community came first and the individual second, and, while retaining the façade of capitalism, it was becoming more and more an experiment in socialism. He suggested that it was not helpful to an understanding of Germany's foreign-trade policy to treat it as a problem of operating differential exchange rates. In essence it was an elaborate method of barter. As the method was a new one under modern world conditions, she had to proceed by experiment—by a process of trial and error. As those who had the misfortune to try to follow the day-to-day workings of Germany's experiment were only too well aware, what might be an accurate description of her methods at one time might be quite inaccurate six months later. The fundamental notion behind these experiments was to link up as closely as possible imports and exports, by trying to make the countries from whom she took food and raw materials take German produce directly in exchange.

He would like to ask those who envisaged the possibility that Germany might wish to return to our own system of trading, whether they were quite certain that we were going to succeed in finding a solution to our own foreign trade problem along existing lines. Everyone actively connected with overseas trade in this country was aware that one of the acutest problems ever since the war had been to find ways of securing an adequate volume of exports. In each cyclical peak year since 1914 the level of exports had been below that in the preceding one; the downward movement seemed to be progressive. Our advantage over Germany lay in our receipt of something like £400 millions a year in "invisible"; but even so, our balance of trade account was in a precarious condition, and no one anticipated an early change in trend. Those who imagined that Germany was going to return to our system might reflect that Germany was a country which had lost most of its past "invisible" resources and saw little hope of accumulating substantial "invisible" in new directions at an early date. What other alternative to her present system, therefore, was open to Germany under existing world conditions?

DR. ELSAS also addressed himself to the question whether the economic system of Germany could continue indefinitely. After

five years of planned economy everybody was now convinced that it could continue. It was difficult to understand why anybody should ever have doubted it. What perhaps might be doubted was whether a planned economy combined with self-sufficiency and a war economy in peace-time was an efficient economy. If the standard of living could be maintained and even increased, the system worked, but if the masses were subjected to an ever-increasing sacrifice, so much so perhaps that the employed were not better off than the former unemployed, then it must be that the system was not efficient.

Germany's adverse balance of trade was of great importance in this respect. It meant more sacrifice for the masses, longer hours of work (the hours were ten or more in the heavy industries already). Even if the standard of living had not suffered up to now, the strain on the people, who were aware of the likelihood of insufficient food, let alone deterioration in its quality, would make itself felt. The efficiency of the worker was diminished. The shortage of food lately in respect of butter, eggs, and meat, and also coffee, might to a certain extent be a passing phenomenon, but the drop in railway efficiency, owing to the scarcity of rolling stock and the inefficiency of repairs, was a more serious matter. The shortage of coal for the civil population was a result of the shortage of railway trucks. As to housing, last year only two-thirds of the number of tenements had been built as compared with the year before, and in the German Press the figure of shortage of dwelling-houses was given as high as 2,000,000. But it was argued that all this could be changed as soon as Germany changed her economic policy, and as soon as she decided to use industrial plant for the output of consumable goods instead of armaments. But would that indeed suffice to bring about a solution? Could a change in German economic policy, the production of "butter" instead of "guns," be expected? He was afraid the dynamics of the present régime were not only an intrinsic part of the system, but were the system itself. It seemed to him that Germany would either have to seek the help of other nations in the way of loans so as to be able to change her economic system, or to go on with armament, which meant more sacrifice for the masses, and would inevitably end by reducing the standard of living so greatly that the failure of the system would be recognized. There was, of course, a danger that before that critical situation developed desperate steps might be taken.

MR. A. T. K. GRANT said that he wished to consider the question, how far could the German economic system carry on with its armaments as well as maintaining other production at the existing level, or how soon it might have to change direction in order to devote greater resources to maintain the standard of living, with fewer resources left for military output? He took it that that was the question in which they were all interested, and he thought that the statistics which gave most of the evidence on which an answer could be based were not the financial statistics—in any rationed economy financial statistics became meaningless—but the statistics of prices

and employment. As regards employment statistics, a very large rise in employment had been taking place, and therefore one wanted to know whether the increase in the demand for labour for all purposes would go on or not, or whether it might be expected to reach an equilibrium with full employment but without any of the unpleasant consequences of unsatisfied labour shortage. If this happened, of course, the German system was going to carry on as it was; it would have reached a sort of peak. But was there any evidence to suggest that armaments expenditure had reached a peak, and that resources would be available to maintain and increase the manufacture of consumable goods? It was true that there might be a good deal of capital expenditure in the armaments programme which might automatically come to an end, but he thought, on balance, from the military point of view, that they would want to devote more and more effort to armaments, and he could not see how the programme could be stabilized, much less tapered off. Therefore they were left with the position that there was a shortage of labour, but that no automatic opportunity would be given for cutting down armament production. What else was to be done? The standard of living could be allowed to fall, but that was bound in time to lead to friction. Possibly Germany's position was strengthened because she had greater reserves to draw upon now in Eastern Europe, and a movement of workpeople to Germany might be witnessed, as Polish workers moved to France before the depression. But he was left with the conclusion that the German economic position might well become tense, and Germany would be faced with the straightforward problem either of slowing down armaments activity or else allowing the standard of living to fall.

A further point he wanted to advance concerned Germany's foreign trade relationships. He thought they were liable to overlook the fact that every German worker devoted to making goods for export was a German worker taken off making goods within the country. It seemed to him that Germany would try to press for loans and use the "nuisance value" of her possible exports in this endeavour to get loans from abroad. This question of pressing for loans was going to come to the forefront just because the mere export of certain surplus goods from Germany was a very different proposition from trying to build permanent markets and maintain them. He could not help feeling that behind much of the problem associated with Germany's trade drive was an attempt partly to acquire forced loans and partly to have a bargaining counter which might be used to extort financial rather than trading advantages.

DR. JACOBSSON said that anyone who had heard from so many quarters during the last five years the continual prophecies about collapse of the economic system in Germany would be beginning to ask himself why it was, after all, that the system went on comparatively well. One reason was certainly that in several ways German economic policy was much more orthodox than was generally believed. An attempt had been made in Germany to establish an equilibrium in essential respects--in the foreign exchange position

and with regard to labour, capital, profits, and interest. Take foreign exchange: Germany could have been exposed to the same difficulties as the gold bloc countries from an over-valued currency. Through various methods, such as granting export subsidies and fixing special rates of exchange, Germany had offset the disadvantage of an overvalued currency by a series of rather complicated expedients. In other words, one artificiality had neutralized a previous one. It was one of the difficulties of interpreting what was happening in the world to-day, that it was generally hard to tell whether an "artificial" measure really introduced a new disequilibrium or whether it in fact helped to bring about a more balanced position. A number of the German artificialities—some of them very unpleasant from a competitor's point of view, or even, taking the long-term view, undesirable in Germany's own interests—afforded a more distinct approach to an equilibrium than had been achieved by some of the old gold bloc countries. Again, take labour and capital. Germany had never denied an employer the right to profits; wages were prohibited from rising to such an extent that profits were wiped out but, on the other hand, profits once earned were subject to very definite charges. If one compared the German measures with the "planning" which was seen in other countries, and which could often be characterised as more or less indiscriminate spending of borrowed funds, trusting to luck that business would turn before the bill had to be footed, there was no doubt that the Nazi economy had been nearer to the orthodox profit economy than had that of other countries whose names they all knew.

A great deal was heard about cheap money, the tendency to lower interest rates which had been observed in almost all countries. But the German rate of interest for State borrowing stood at 4 to 4½ per cent; it had not been brought down to the very low rates found in some other cases. Dr. Schacht had tried to keep an equilibrium in the capital market which, having regard to the heavy demand for capital in Germany, was much more in conformity with orthodox ideas than people commonly realised. A great deal of the success of the German credit expansion was due to the fact that the economic system had been run by people who really understood the requirements of economic equilibrium. But would this maintenance of essential equilibrium continue? There was one consideration to which due weight must be given, namely, that the German public indebtedness had increased by at least five milliards of marks a year. Was this spending of borrowed funds a necessary condition of the system, and could it be expected to continue indefinitely? Dr. Schacht had laid down two conditions, the first, that the increasing indebtedness must not be higher than the burden which could be carried by future budgets, and, secondly, that annual borrowings must be within the amount of current savings. There would no doubt also be other conditions which had to be taken into account, but those two conditions showed clearly that Dr. Schacht was thinking on fairly orthodox lines.

How long could this increase of indebtedness go on? The capital

amount of the public debt of Germany was not much more than one half of the public debt of this country, and Germany had nearly twice the population. Whatever might be said about the Germans, they had so far accepted the limitations in wages and other incomes necessary to avoid inflation; to say, as many people seemed to do, that credit expansion was a panacea which could be used to avoid savings and adjustments in costs was to present the whole thing wrongly.

PROF. F. A. VON HAYEK desired to preface his remarks with one general consideration. Gratitude was due not only to Mr. Crump but to the Society for the discussion of one of the most important problems of the moment, but he thought Mr. Crump would be the last to deny that all individual efforts in this direction must be to some extent amateurish and limited. A clear view of the situation might be obtained by the unaided effort of an individual in the case of a country which provided one with all the information which was desired; but in the case of a country concealing the information, an adequate picture could only be arrived at by the systematic and co-operative effort of a group of people assisted by a considerable apparatus.

The difficulties which arose in this connection could be illustrated by the one purely statistical point he wanted to make. Mr. Crump had spoken about the invisible rise in the cost of living. He (the speaker) had been told by a person who ought to know that the reason why the cost-of-living index for Germany did not rise was partly because in Germany they acted on a theory which was, to say the least, peculiar - the theory that since, if the price of a particular commodity rose, people would be compelled to buy less of it, the weight of that particular commodity in the compilation of the index ought to be reduced.

He felt that Mr. Crump's exposition was incomplete in so far as Germany's economic and financial policy was concerned. He referred particularly to the question whether there had or had not been anything which could be called inflation in Germany. What he missed from Mr. Crump's paper was a discussion of the developments of the last ten months. There had been quite definite changes at least in the official policy of the Germans, relating to two critical dates. In April 1938 they proposed to stop the former method of finance and return to one which was more orthodox. Their feeling was that the unorthodox method was applicable so long as there was a state of large unemployment, but not in a state of full employment. This policy, apparently, had not really been adhered to. Since the events of last September there had been an extensive discussion about the necessary speeding up in the economic policy, in which some of the German authorities were much more frank than they had ever been before. If one read the recent speeches by Dr. Schacht or Dr. Funk one got interesting pictures of what had been happening. It would be dangerous to under-rate the intelligence with which the system was directed by the man responsible for Germany's economic policy and the extent to which they understood what they were

doing. In a recent speech, delivered on November 29th,* Dr. Schacht stated that the credit money made available for the armaments programme produced a demand for consumption in so far as it was paid out in the form of wages and salaries. But the armament manufacturers delivered military goods which were produced but not consumed. Care must be taken, said Dr. Schacht, that in addition to armament production, a volume of consumption was produced sufficient for the needs of the population, and, secondly, the less that was consumed, the greater the number of workers that could be allotted to armament. This, however, meant greater consumption, and consequently increased labour requirements. "The less I consume the more I save, and the more I save the more I can spend on armaments." In other words, armaments could be financed, not through money creation, but only through saving.

As regards Germany's commercial policy, he felt that Mr. Crump's suggestion that we might borrow a leaf from Germany's book was a most dangerous one. While Germany had for a time indeed succeeded in increasing her trade with South-Eastern Europe at the expense of Austria, Czechoslovakia and Italy, there were distinct signs of a reverse.

The main reason for this was that these countries had realized what German methods involved, and became more and more anxious to deal with countries which had free exchanges. The one great advantage this country had in competition with Germany was that it was a free exchange country.

DR. W. G. J. KXOR said that he wished to point out a few factors which in his view explained the relative success of the last five years of Germany's economic policy. When Herr Hitler came into power Germany was by no means as poor as German official propaganda to-day made out. She then had large reserves of raw materials and a very considerable reserve of gold and foreign exchange, not all of it in the Reichsbank but a very large proportion in the hands of private persons and commercial companies. Germany had also a very substantial labour reserve. To-day all those reserves had largely been used up by the Government. The reserves of raw materials and of gold had declined very substantially, and the labour reserve had practically disappeared. Again, German indebtedness was in 1933 one of the lowest in the world. Germany certainly would not have been able to carry on her policy of large-scale borrowing if that indebtedness had been larger.

In addition, during these last few years Germany had had a certain amount of luck. There had been a strong international trade recovery in the crucial years just when revival in foreign trade was essential for her economic system. This revival was something quite beyond the influence of the German Government. Moreover within the last ten months the German Government, by the annexation of Austria, had obtained a fresh reserve of gold foreign exchange and realizable foreign capital assets—approximately

* An English translation of this speech is given in the *Weekly Reports of the German Institute for Business Research*, December 1st, 1938.

to the extent of £140 million—which had enabled them to go on importing on a much larger scale than would otherwise have been possible. Another “reserve” which had been drawn on heavily was the standard of living of the population.

He gave these examples to show that the relative success of the Nazi Government in many spheres of economic policy had been due less to any outstanding brilliancy of management than to its ability to draw on very substantial reserves, and its readiness to risk depleting these to the point of exhaustion. The question whether the present policy could be continued must very largely be answered by another question—namely, whether it was possible to go on depleting exchange reserves, piling up internal debt, mobilizing further labour reserves, and lowering the standard of living. It was obvious that Germany would find it increasingly difficult to do these things—certainly much more difficult than during the years 1933–38. There was, consequently, a grave danger that she would try to obtain relief, as she had obtained relief from the annexation of Austria, by a further extension of her political frontiers into south-eastern Europe.

MR. CRUMP said that he would reserve his main reply for the *Journal*, but he desired now to say just two things. First, he wrote his paper before seeing a copy of Dr. Schacht's latest speech: he was not quite sure whether that was a good or a bad thing from his point of view. The second thing was that he did not advocate in this paper or anywhere else the adoption of Nazi economics: what he did suggest was that they merited critical examination, and that they ought to consider whether their own system, which he did believe in, and the Nazi system, which he was not at all sure that he believed in, could work side by side. He had simply put that forward as one of the points which the world would have to settle during the next few years.

Mr. Crump's written reply was as follows:—

One of the chief objects of my paper was to arouse a discussion upon the economic methods and position of Germany, and I think that I can claim that I have succeeded. This is my general answer. With many of the points raised I find myself in broad agreement. Thus, I agree with Mr. Hawtrey that Germany has successfully attained reflation, and I think Mr. Hawtrey agrees that one of the conditions of that success was the stiffer discipline introduced by the totalitarian system. Mr. Hawtrey is also right in saying that export subsidization combined with restriction or duties on imports is tantamount to currency depreciation. South Africa actually tried that system just before she abandoned the gold standard.

Again, I am in general agreement with Mr. Ellinger. The reason why Germany has given up her system of special bills, however, is that last year she achieved full employment, and so any further attempt at finance by special bills discounted with the banking system must have produced inflationary symptoms. In Mr. Hawtrey's simile, by 1938 Germany had already eaten all that particular cake, and so a new culinary technique had to be devised.

Mr. Balogh had the advantage of having later statistics and information at his disposal than I had. Indeed, his study of the German position was made at a later date than mine. But I cannot agree that there is any discrepancy between the text of my paper and the appendix, especially as he implies that the appendix goes up to March 31st, 1939, whereas it stops at March 31st, 1937. His point about the liquidation of private bills is valid. In the concluding portion of his speech Mr. Balogh has ventured upon political ground, whereas at the beginning of my paper I said that politics rightly have no part in our proceedings. That is the reason why I refrain from any comment on his conclusions. Nor do I feel that Mr. Glenday's remarks call for comment, especially as he did me the service of replying to several of the points already raised in the discussion.

Dr. Elsas raised a very important point when he asked if a change in German economic policy, from "guns" to "butter" was practicable. The difficulty admittedly is great and I do not see that it is wholly due to Germany's adverse trade balance. It was a difficulty which I recognized in my paper, when I indicated the problem of switching over production from capital goods to consumers' goods. Mr. Grant again has found one crux of the problem when he says that the most important statistics are those of prices and employment. As I said above, the big new difficulty which arose in 1938 was the fact that German employment reached capacity. I am not convinced, however, that Germany is to-day anxious to obtain foreign loans.

I was very glad that Dr. Jacobsson was able to be present, for he is in much closer contact with Germany than I am. I can only express agreement with much of what he says. Professor von Hayek has brought my paper up to date in certain important respects. But while the fault may be mine, he certainly over-stressed the sentence in my paper which suggested that we might borrow a leaf from Germany's book. May I refer him to a later sentence in which I said that we could study ways of making liberal and totalitarian economics work side by side. That is a very different matter. Dr. Knop in conclusion raised one interesting point. I have often wondered myself how much the Third Reich owed to the fact that they assumed power at the beginning of a period of world recovery. And I am not sure that it is wholly a disadvantage that my own observations happened to coincide approximately with the end of that recovery period. German experience under world economic conditions since 1937 will invite a new and even more absorbing study, but the time for that is not yet ripe.*

As a result of the ballot taken during the meeting, the candidates named below were elected Fellows of the Society :—

David John Finney
Alfred Edward Patching

* Readers of my paper are reminded that it was read and discussed (and my reply was also drafted) before the German annexation of Czechoslovakia.—
N. E. C.

THE CARRYING TRADE OF BRITISH SHIPPING

By H. LEAK

[Read before the ROYAL STATISTICAL SOCIETY, February 21st, 1939, the PRESIDENT, PROFESSOR A. L. BOWLEY, C.B.E., Sc.D., F.B.A., in the Chair.]

As the greatest carriers in the world, it is important that we should from time to time consider the work that our merchant shipping is doing. In the course of the valuable paper read by Dr. Isserlis last session he dealt with one aspect of this question—viz., the value of the different descriptions of goods carried by tramp shipping, and he also gave some particulars of the investigation carried out by the Chamber of Shipping, on the invitation of the President of the Board of Trade, into the earnings of British shipping in 1936. My concern is primarily with a different aspect—the share of British shipping in the carrying trade of the world.

This subject was first investigated by the Departmental Committee on Shipping and Shipbuilding after the war, and Appendix E of the Report of that Committee (Cd. 9092) contains the estimate then made as to the share of British shipping in the world's carrying trade in 1911 and 1912. The results there published will be compared with those of a year of great depression in the shipping industry, 1931, and with the latest year for which data are available in full, 1936, a year when employment of shipping was good, but not booming, as it was for the greater part of the year 1937.

With two negligible exceptions, the United Kingdom is the only country in the world producing statistics at the present time which are adequate for this purpose. These statistics, which are not available for any year prior to 1936, relate to the value of goods carried in vessels of different nationalities to or from each country, and are published under the title "Nationality of Carrying Vessels"; in the latest issue comparative figures are given for 1936 and 1937. For the purposes of this paper I have had to use the original data, as there are residual items in the publication which do not enable a precise comparison to be made between the proportion of the value of imports and exports carried in British ships and the British proportion of vessels entered and cleared with cargo in the trade with the various areas distinguished in the navigation statistics. Prior to 1936 there were available for this country only these navigation statistics, which relate to entrances and clearances of vessels with cargo and in ballast, and the estimates for 1911–12 mentioned above had necessarily to be made on the basis of navigation statistics. It would be hazardous to attempt to amend all those earlier figures in the light of

the information provided by the new statistics for 1936 and 1937, but an amendment of the 1931 figures may be made without risk of serious inaccuracy.

Two other methods of assessing our share of the world's carrying trade may be mentioned. In the first place, measurement could be based on the weight of goods carried. Statistics on this point are very incomplete, as only a relatively few countries publish statistics of the weight of goods carried to and from their ports in the ships of different nationalities. The available information is summarized in Table 22. Secondly, measurement could be based on the amount of freight paid for the carriage of goods. On the subject of gross freight statistics also are sparse, but an estimate of the total earnings of ships owned in the United Kingdom was made by the Chamber of Shipping of the United Kingdom for the years 1931 and 1936, and the fact that such an estimate was available was an additional reason for the selection of these years for purposes of comparison in this paper.

Even if statistics of the weight of goods carried were available, it is open to question whether this method of assessment would be so satisfactory as the value of goods carried for the purpose of assessing our share of the world's carrying trade, though it would be interesting to have such figures, especially if it were possible to segregate the roughest commodities, such as coal, ore and timber. The use of statistics of the weight of goods carried would, however, be more satisfactory than basing conclusions on the movement of shipping, the method which has had very largely to be followed, *faute de mieux*, in this paper. The best method is probably that based on the gross earnings of shipping, as indicating the amount of money which British shipowners manage to obtain in the various trades in competition with foreign owners. That method is unfortunately not available.

Apart from the trade of the United Kingdom and of the United States, as to which special considerations apply, the estimate of the value of the trade with a given area that was carried by British ships has been based on the assumption that the British share of the imports or exports was the same as the British share of the total entrances or clearances of vessels with cargo in trade with that area. Statistics of entrances and clearances are defective in two respects for the purposes of this enquiry. In the first place, they relate to the net tonnage of the vessel, and not to the cargo carried, so that if a vessel discharges or loads but a few tons of cargo, or even mails, her whole net tonnage is entered in the statistics. Secondly, they do not show the whole of the trade done by the vessels, but only as a rule the country in which cargo is first taken on board (in the case of

entrances), and the furthest country for which cargo is loaded (in the case of clearances). Hence a liner leaving the United Kingdom for Australia via the Mediterranean, India, and possibly other ports, is included in the clearances for Australasia, and does not figure in those for Mediterranean and Indian ports. Similarly, a vessel from New Zealand arriving in the United Kingdom via the Panama Canal is included in the United Kingdom statistics of entrances of vessels with cargo from Australasia, but the trade done by the vessel with Central America or other intermediate areas from which she may bring cargo does not figure in the records. Thus entrances and clearances of shipping from and to intermediate destinations tend to be relatively lower than the trade figures for the area, and whether this will have any effect on the estimate depends upon whether the British share of the shipping to the intermediate area differs to any great extent from the British share to the far area.

Notwithstanding these defects, it is believed that estimates based on statistics of entrances and clearances, while more reliable for some sections of the world than for others, do not seriously misrepresent the *variations* from time to time in the British share of the world's carrying trade as a whole, though the recent United Kingdom statistics of the value of goods carried in vessels of various nationalities show that the statistics of entrances and clearances definitely under-state our share in any one year of the carrying trade between this country and both Empire and foreign countries.

Since it has been necessary to use statistics of the movement of shipping, the value of the trade to which the British proportion of the entrances and clearances has been applied relates to water-borne trade only. The available statistics do not normally distinguish water-borne from land-borne trade, but the only important difficulty in this respect is presented by the trade of foreign countries in Europe.

The estimates made relate to international trade and to shipping engaged in such trade, the value of the goods carried in the coasting trade and the shipping engaged in such trade being, in general, excluded from the figures. The trade between Canada and the United States on the Great Lakes has been included in view of its importance to British and United States shipping. Trade of a country with a dependency separated from it by sea has normally been treated as international trade, though such trade—as, for example, that between Japan and Kwantung—may be reserved as coasting trade to national vessels. The trade between Japan and Formosa, which forms part of the Japanese customs area, is, however, regarded as coasting, as is that between France and Algeria.

No account has been taken of passenger traffic. Statistics re-

lating to such traffic are very defective, and there are in any case no statistics for such traffic corresponding to the statistics of the values of goods carried in ships. The importance of passenger traffic relative to the carriage of cargo varies greatly in different geographical areas, the North Atlantic being an example of an area in which the relative importance of passenger traffic is very great. The information obtained by the Chamber of Shipping for the year 1936 shows that in that year receipts from passenger traffic in the aggregate amounted to about 16 per cent. of the gross receipts of British shipping as a whole. The conditions of secrecy under which the information was supplied by shipowners preclude any more detailed particulars being given.

TRADE OF THE UNITED KINGDOM

The principal part of the work done by British shipping is in carrying goods to and from the United Kingdom. The term British shipping covers all vessels registered as British, including those registered in the Dominions. The aggregate figures for 1936 are immediately available. Of imports valued at £839·6 million, British ships carried £570·1 million or 68·0 per cent., while of exports of United Kingdom goods, valued at £426·0 million, British ships carried £341·6 million or 80·2 per cent., the corresponding total for re-exports being £58·8 million and the British share £34·5 million or 58·6 per cent., making the British share of total exports 77·6 per cent. The corresponding proportions before the war, as estimated by the Departmental Committee on Shipping and Shipbuilding, were 74 per cent. for imports and 75 per cent. for total exports. Seeing that the distribution of our trade is now so very different from before the war, these proportions need to be split between trade with British countries and trade with foreign countries in order to appreciate the changes that have taken place. Such a split gives the following figures, to which those for 1937 have been added for purposes of comparison:—

Proportion Carried under British Flag

United Kingdom trade with	British countries			Foreign countries		
	1913	1936	1937	1913	1936	1937
Imports	93	93·4	92·4	66	51·6	51·2
Exports (including re-exports) ...	95	98·6	98·7	65	60·5	58·5

The Pre-war Estimate.—The figures given for 1913 in the above table differ from those contained in the Departmental Committee's report, a typographical error being corrected and the proportions of imports from and exports to British countries being taken as the proportions given in the report for entrances from and clearances to such countries, respectively, instead of the proportion for entrances and clearances combined—viz. 94 per cent. as printed. This has involved consequential alterations in the proportions for foreign countries, which were arrived at by deducting the figures for British countries from the total.

It should be mentioned that Egypt was included among the British countries in the pre-war figures, and that the calculation of proportions for United Kingdom trade was made on the figures for 1913, though the summation for our share in the whole of the world's carrying trade related to 1911 and 1912. The inclusion of Egypt in a different group in the two sets of figures does not affect the comparison to any appreciable extent. A factor of greater importance is the creation of the Irish Free State after the war, but if trade with that country is excluded, the proportions for British countries in 1936 only become 93·1 per cent. for imports and 98·4 per cent. for total exports.

The figures for 1937 show a decline in the proportion carried by British vessels except as regards exports to British countries. If pre-war figures, derived from the Committee's report, are compared with the recent figures, the *prima facie* suggestion is that, as regards imports from British countries, the proportion carried in British ships is now the same as before the war, while for goods exported to such countries our share is now substantially greater than it was then. In the case of trade with foreign countries, British ships are shown as carrying a much smaller proportion than before the war, the decline being particularly great for imports.

The British proportion of the net tonnage entered with cargo from British countries was, however, only 89·6 per cent. in 1936 and 88·4 per cent. in 1937, these being figures comparable with those used for compiling the pre-war estimate, so that in the case of imports from British as well as from foreign countries, foreign competition has increased. For clearances with cargo to British countries, British shipping has maintained the pre-war proportion of 95 per cent., the figures for 1936 and 1937 being 95·2 and 95·5 per cent., respectively.

The particulars given for foreign countries require some further examination, particularly in view of the striking decline shown for imports as compared with the much smaller decline for exports.

For entrances and clearances with cargo the British proportion is given below :—

Foreign countries			1913	1936	1937
			Per cent.	Per cent.	Per cent.
Entrances	...	...	59·6	45·0	45·1
Clearances	...	...	52·6	49·0	47·3

These figures also show the same relative movement as the estimated value figures, and the relatively much higher British proportion of entrances than of clearances before the war is noteworthy. The explanation is, I think, to be found in the particular circumstances of the coal trade. While no precise information is available for the period before the war, the statistics of arrivals and departures * of vessels in the foreign trade indicate that of the total exports from the principal coal exporting districts—Firth of Forth, North-East Coast, Humber and South Wales—British ships carried only just over 50 per cent. Table I shows that the proportion in 1936 was the same as in 1913, but the increased relative importance of coal exports to British countries has doubtless something to do with this. Since exports of coal to British countries in 1913 were only 3 per cent. of the total, and coal was then of prime importance in the movement of shipping to foreign countries, the lower figure for clearances than for entrances shown in the above table is not unexpected. Foreign ships continue still to carry a higher proportion of coal exports than of other exports to foreign countries from the United Kingdom. In 1936 the quantity of coal exported in foreign ships to foreign countries was 58 per cent. of the total, whereas foreign ships carried only 39·5 per cent. of the value of all goods exported to these countries. Making a rough allowance for coal, the proportion of other exports carried in British ships to foreign countries was about 68 per cent. in 1913, the corresponding figure for 1936, which can be estimated with greater accuracy, being 62·3 per cent. On the face of it, therefore, both for coal exports and for other exports to foreign countries, there has been a considerable decline in the proportion carried in British ships. The estimate of the British share of the carrying trade of the United Kingdom in 1913 is, however, open to question.

The Departmental Committee used the figures of the proportion

* Vessels calling, in the course of a single foreign voyage inward, at one or more ports in the United Kingdom before arriving at their final port of discharge are recorded among the *arrivals* at each of those ports, but among the *entrances* at one only of them. Similarly, vessels leaving a port in the United Kingdom and calling at one or more other such ports in the course of a single foreign voyage outward are recorded among the *departures* from each of those ports, but among the *clearances* at one port only.

of British to foreign tonnage arrived and departed at each of twelve districts of the United Kingdom (ports outside those districts representing only 3 per cent. of the total trade) for the purpose of estimating the total value of imports and exports carried in British vessels. They adopted this method owing to the much greater quantity of shipping tonnage needed for carrying cargoes of coal than for carrying other exports of equal value. A split of the total is also desirable, on the ground that at certain ports there are daily passenger services to the Continent, and a high proportion of British or of foreign shipping on those services should not be allowed to influence the final result to a greater extent than is justified by the relatively smaller value of goods carried. In fact, the greater the detail in which the available material can be analysed, the greater the probable accuracy of the results. It must, however, be borne in mind that statistics of arrivals and departures of shipping are not comparable with those of entrances and clearances, owing to the duplication which occurs in the former as a result of vessels discharging or loading part cargoes at more than one port, the full tonnage being recorded at each port among the arrivals and departures, but at only one port among the entrances and clearances. *Prima facie*, it might be expected that the British share of the arrivals and departures would be greater than that of the entrances and clearances, since foreign vessels frequently call at our ports once only to load or discharge part cargo, while British vessels are more likely than foreign vessels to visit a number of ports. This is borne out by the statistics, which show, for example, the British shares of arrivals and departures in 1913 to be 68·7 and 62·8 per cent., the corresponding figures for entrances and clearances being 65·8 and 59·1 per cent. Accordingly the share of the total trade of the country carried by British vessels is likely to have been over-estimated by the use of statistics of arrivals and departures by something of the order of 3 per cent., in comparison with a similar estimate based on statistics of entrances and clearances. Seeing that the estimate made for the trade with British countries was based on the statistics of entrances and clearances, and this was deducted from the total to arrive at the share of British shipping in the trade with foreign countries, the over-estimate of the latter proportion is appreciably greater. A factor tending to reduce the actual over-estimate is that the statistics of the nationality of carrying vessels now available indicate that the British share by value is substantially greater than the British share of the entrances and clearances. The following table shows the figures for 1913 as given in the Departmental Committee's Report with corresponding figures for 1936. The two sets of figures are not precisely comparable, owing to the creation of the Irish Free State

after the war, and while it would be possible to amend the 1913 figures so as to exclude trade at ports in Southern Ireland, it is not possible to make any adjustment of the port statistics for 1936, so as to exclude the trade between ports in this country and those in the Irish Free State, which is of much greater importance.

TABLE 1.—*Trade at Ports of the United Kingdom in 1913 and 1936*

Situation of Ports	Trade of the United Kingdom				British proportion of tonnage with cargo				Estimated value of goods carried in British ships			
	Imports		Exports (including re-exports)		Arrived		Departed		Inwards		Outwards	
	1913	1936	1913	1936	1913	1936	1913	1936	1913	1936	1913	1936
	£ million		£ million		Per cent.	Per cent.	Per cent.	Per cent.	£ million		£ million	
<i>Coal Districts</i>												
(1) Firth of Forth	23	19	14	7	68	51	38	38	16	9	5	3
(2) North-east Coast...	15	14	22	16	36	36	42	37	5	5	9	6
(3) Humber	74	76	67	38	66	55	54	48	49	42	36	18
(4) South Wales	14	13	35	25	45	53	58	63	6	7	20	16
Total...	126	122	138	86	—	—	—	—	76	63	70	43
<i>Other Districts</i>												
(1) London *	279	374	167	161	71	60	75	70	198	224	125	112
(2) Mersey	211	295	216	152	91	72	94	87	192	147	203	131
(3) East Channel...	38	13	18	10	32	49	39	46	12	7	7	5
(4) West Channel	28	35	29	38	64	48	55	49	18	17	16	18
(5) Bristol Channel	21	30	4	1	82	65	89	80	17	20	4	1
(6) Tees	4	3	12	6	40	59	65	83	2	2	8	5
(7) Clyde	21	26	37	28	87	87	88	96	18	22	33	27
(8) Ireland †	15	10	2	4	93	74	93	86	14	7	2	4
Total...	617	696	485	400	—	—	—	—	471	446	398	303
Unaccounted for (3 per cent.)	26	27	12	14	—	—	—	—	20	17	10	10
Total...	769	845	635	500	—	—	—	—	567	526	478	356

* Including Queenborough and, for convenience, Harwich.

† Northern Ireland in 1936.

The estimate made by the above method of the value of total imports carried in British vessels in 1936 (£526 million) is £44 million (8 per cent.) less than the recorded figure of £570 million, while for exports the estimate of £356 million more nearly approaches the recorded figure of £376 million, the difference being £20 million, or 5 per cent. These appreciable differences show the unreliability of using these statistics as a measure of the carrying trade of British shipping, but they happen to err in the right direction, and it may perhaps not be unreasonable to assume that the figures for 1913 given on p. 216 were, after all, under rather than over-estimated. The division as between British and foreign countries seems to need

a little adjustment. In the trade with British countries, the British proportions of entrances and clearances with cargo in 1913 were, as already mentioned, 93 and 95 per cent. The correct proportions of imports and exports by value were certainly higher, and I think that figures more nearly approaching to accuracy would be 97 per cent. for imports and 99 per cent. for exports. I hardly imagine that anyone would suggest that with the great increase in foreign competition since the war we had increased the proportion of our exports to British countries carried in British ships, which is what would be implied by adopting the Departmental Committee's figure for purposes of comparison, or, in fact, any lower proportion than 99 per cent. Using these proportions, we have the following result for the trade of the United Kingdom in 1913.

TABLE 2.—*Trade of the United Kingdom in 1913, and Estimated Value of Goods carried in British Ships*

Year 1913	Imports			Total Exports		
	Value	Carried in British ships		Value	ships	
		Value	Proportion		Value	Proportion
Total	£ mill. 769	£ mill. 567	Per cent. 74	£ mill. 635	£ mill. 478	Per cent. 75
of which						
British Countries	192	186	97	209	207	99
Foreign ..	577	381	66	426	271	64

Note.—In the above table Egypt has been included among the foreign countries.

While the decline shown between the revised 1913 proportions for foreign countries and the proportions recorded for 1936 is slightly less than it appeared to be from the Departmental Committee's figures, it is very marked for imports, and the question arises as to whether the competition of foreign shipping has been intensified since the depression, or whether we have more or less held our own in recent years.

Estimate for 1931.—For 1931 an estimate could be made on the same lines as that made for 1913, but the method then used can hardly be regarded as satisfactory. I think it is better to arrive at a figure by using, as a basis, the statistics of entrances and clearances by the areas distinguished in the navigation returns, splitting each of the latter into British and foreign countries, which can be done from the original data at the Board of Trade. The figures are given in the table on p. 222, showing the aggregate value of the trade

TABLE 3.—*Trade of the United Kingdom in 1931*

Area	Trade		British proportion of tonnage with cargo		Estimated value of goods carried in British ships	
	Imports	Exports (including re-exports)	Entered	Cleared	Imports	Exports
	£ mill.	£ mill.	Per cent.	Per cent.	£ mill.	£ mill.
<i>British Countries</i>						
Irish Free State (by sea) ...	30.6	34.6	97.2	99.4	29.7	34.4
Europe (Atlantic) and Western Mediterranean Countries ...	3.5	4.9	99.5	95.3	3.5	4.7
Central and Eastern Mediterranean Countries ...	1.7	2.3	72.2	71.7	1.2	1.6
West and South Africa ...	19.3	32.6	93.2	94.8	18.0	30.9
East Africa, Persian Gulf, India	55.1	40.5	96.6	98.7	53.2	40.0
Eastern Asia and Islands in the Pacific ...	7.6	11.4	40.9*	100.0	3.1	11.4
Australasia ...	83.6	27.0	92.4	100.0	77.2	27.0
North America ...	34.9	23.6	86.1	89.5	30.0	21.1
West Indies and Central America (Atlantic Coast) ...	4.4	4.3	80.6	72.0	3.5	3.1
South America—Atlantic Coast	0.7	1.1	83.7	99.8	0.6	1.1
Total—British Countries ...	241.4	182.3	—	—	220.0	175.3
<i>Foreign Countries</i>						
Northern Europe ...	271.5	105.5	43.0	46.4	116.7	49.0
Europe (Atlantic) and Western Mediterranean Countries ...	72.4	48.8	65.9	58.3	47.7	28.5
Central and Eastern Mediterranean Countries ...	38.2	28.9	42.9	39.7	16.4	11.5
West and South Africa ...	3.4	2.7	61.9	54.9	2.1	1.5
East Africa, Persian Gulf, India	7.6	5.0	90.3	86.5	6.9	4.3
Eastern Asia and Islands in the Pacific ...	23.4	19.6	50.8	57.4	11.9	11.3
North America ...	104.0	26.8	55.5	70.6	57.7	18.9
West Indies and Central America (Atlantic Coast) ...	16.6	5.4	56.2	82.5	9.3	4.5
South America—Atlantic Coast	63.8	21.5	84.6	81.8	54.0	17.6
South and Central America—Pacific Coast ...	10.4	3.5	59.6	97.9	6.2	3.4
Other Areas ...	2.5	0.0	7.0	—	0.2	0.0
Total—Foreign Countries	613.8	267.7	—	—	329.1	150.5

* This abnormal figure is due to a marked decrease in British tonnage and increase in Norwegian tonnage among the small tonnage of vessels entered from the British countries in this area.

Note.—The trade of the Soviet Union has been divided between Northern Europe, Central and Eastern Mediterranean countries, and Eastern Asia and Islands in the Pacific in the proportions indicated by the net tonnage entered and cleared from or for these areas. The trade of Switzerland and Czechoslovakia has been assigned to Northern Europe, and that of Austria and Hungary to Central and Eastern Mediterranean countries.

with each area in 1931, the British proportion of vessels entered and cleared with cargo, and the results of applying these proportions to the respective values of imports and exports.

On this basis the proportion of our trade carried in British ships would be 91.1 per cent. for imports from British countries and 96.2 per cent. for exports to those countries, the corresponding proportions for foreign countries being 53.6 per cent. for imports and 56.2 per cent. for exports. These proportions are in each case underestimated. The following table shows for 1936 and 1937 a comparison between the proportions for entrances and clearances, corresponding with those given in the above table, and the proportion of the value of imports and exports as recorded.

One very low figure in the table calls for comment. Among the uniformly high proportion by value of imports from the various British countries carried in British ships will be noted one of about 41 per cent. in both years for imports from British countries in the Central and Eastern Mediterranean. Essentially this is Palestine, and it is found that of the imports of food, drink, and tobacco from that country—practically all oranges and grapefruit—Danish, Norwegian, and Swedish vessels carried two-thirds of the total in each year. The reason for shipping this fruit in Scandinavian vessels in preference to British seems to be that the foreign vessels are specially built fruit-carriers, and come into the trade only for the fruit season, whereas the British lines are general cargo-carriers throughout the year, and are a little slower than their foreign rivals. This explains why the proportion by value of imports carried in British ships is so much lower than the British proportion of tonnage entered and cleared with cargo.

The proportions for movement of shipping and for value of trade for each area show in general a fairly constant relationship with each other. In nearly all cases the British proportion of the value of imports and exports is higher than that of the net tonnage entered and cleared for ports in the same area, the difference being particularly marked in respect of the inward and outward movement with foreign countries in the Central and Eastern Mediterranean, Eastern Asia and North America, the inward movement from the Pacific Coast of South America and the outward movement to foreign countries in West and South Africa and in East Africa, Persian Gulf and India (both small), and in the West Indies and Atlantic Coast of Central and South America. In the case of Central and Eastern Mediterranean the difference is probably due to British shipping proceeding to or from countries beyond the Suez Canal carrying part cargoes to or from Egypt to a greater extent than does foreign shipping similarly proceeding beyond the Suez Canal. The shipping

TABLE 4.—Value of the Trade of the United Kingdom in 1936 and 1937 and the Proportion carried in British Ships

Area	Value of total imports			Proportion in British ships			British proportion of tonnage entered with cargo			Value of total exports			Proportion in British ships			British proportion of tonnage cleared with cargo		
	1936		£ mill.	1936		Per cent.	1936		Per cent.	1937		£ mill.	1937		Per cent.	1937		Per cent.
	£ mill.	Per cent.		£ mill.	Per cent.		£ mill.	Per cent.		£ mill.	Per cent.							
British Countries																		
Irish Free State	18.1	18.6	4.0	99.9	99.8	96.1	96.4	99.1	98.2	97.7	97.7	22.9	99.6	99.6	98.2	97.7	97.7	97.7
Europe (Atlantic) and Western Mediterranean Countries	3.8	4.0	4.0	99.7	99.4	98.6	99.1	96.4	99.1	98.3	97.9	5.6	98.3	97.9	94.6	95.0	95.0	95.0
Central and Eastern Mediterranean Countries	2.8	4.0	4.0	99.7	99.4	98.6	99.1	96.4	99.1	98.3	97.9	3.4	98.1	96.3	82.6	79.9	79.9	79.9
West and South Africa	20.4	41.7	41.7	95.2	91.9	92.2	94.4	92.2	94.4	92.2	94.4	51.0	99.2	99.2	99.4	93.4	93.4	93.4
East Africa, Persian Gulf, India	72.7	89.4	89.4	96.2	92.2	94.4	92.7	94.4	92.7	94.4	92.2	41.8	99.6	99.8	99.7	99.7	99.7	99.7
Eastern Asia and Islands in the Pacific	9.1	13.9	13.9	83.3	87.9	85.6	85.3	85.3	85.3	85.3	85.3	11.0	97.3	96.3	85.8	100.0	100.0	100.0
Australasia	105.3	121.8	121.8	96.5	95.0	90.3	86.5	86.5	86.5	86.5	86.5	50.2	99.8	99.9	99.7	100.0	100.0	100.0
North America	76.8	91.3	91.3	87.9	86.1	82.3	79.6	79.6	79.6	79.6	79.6	25.3	93.9	94.9	89.6	99.6	99.6	99.6
West Indies and Central America (Atlantic Coast)	8.2	11.3	11.3	94.5	96.5	86.1	94.3	94.3	94.3	94.3	94.3	5.2	94.1	96.8	83.5	91.2	91.2	91.2
South America—Atlantic Coast	1.2	1.4	1.4	91.3	83.8	100.0	91.3	91.3	91.3	91.3	91.3	1.2	99.2	99.4	97.3	96.1	96.1	96.1
Other Areas	0.8	1.2	1.2	21.1	48.1	34.5	100.0	100.0	100.0	34.5	100.0	—	—	—	—	—	—	—
Total—British Countries	328.2	409.6	409.6	93.4	92.4	89.6	88.4	88.4	88.4	89.6	88.4	217.6	98.6	98.7	95.2	95.2	95.2	95.2
Foreign Countries																		
Northern Europe (Foreign)	201.7	243.6	243.6	35.0	32.3	31.4	30.9	30.9	30.9	31.4	30.9	118.0	42.4	40.0	36.8	34.7	34.7	34.7
Europe (Atlantic) and Western Mediterranean Countries	43.2	43.4	43.4	63.1	6.2	65.4	69.1	69.1	69.1	65.4	69.1	33.0	63.9	65.7	60.2	60.5	60.5	60.5
Central and Eastern Mediterranean Countries	36.1	46.9	46.9	51.4	56.3	36.6	35.3	35.3	35.3	36.6	35.3	22.3	82.3	78.5	72.3	62.3	62.3	62.3
West and South Africa	2.3	2.9	2.9	46.5	56.8	50.9	37.7	37.7	37.7	50.9	37.7	3.2	86.6	85.2	62.3	48.7	48.7	48.7
East Africa, Persian Gulf, India	11.4	16.6	16.6	77.2	73.2	80.2	72.7	72.7	72.7	80.2	72.7	6.5	99.6	97.5	82.1	76.5	76.5	76.5
Eastern Asia and Islands in the Pacific	24.5	31.1	31.1	70.2	69.8	48.5	47.2	47.2	47.2	69.8	47.2	14.7	70.6	67.1	56.1	56.2	56.2	56.2
North America	92.3	113.1	113.1	52.5	50.2	36.8	37.0	37.0	37.0	36.8	37.0	35.9	38.9	56.8	39.6	37.7	37.7	37.7
West Indies and Central America (Atlantic Coast)	24.8	28.5	28.5	57.8	56.0	49.3	46.7	46.7	46.7	49.3	46.7	7.7	85.3	85.2	42.4	39.3	39.3	39.3
South America—Atlantic Coast	59.2	72.6	72.6	46.1	43.2	77.4	76.3	76.3	76.3	77.4	76.3	22.4	95.4	95.0	81.9	78.1	78.1	78.1
South and Central America—Pacific Coast	13.7	18.0	18.0	69.7	70.8	53.2	58.9	58.9	58.9	53.2	58.9	3.5	94.6	94.1	97.2	98.5	98.5	98.5
Other Areas	1.2	0.7	0.7	0.2	0.1	3.1	—	—	—	3.1	—	—	—	—	—	—	—	—
Total—Foreign Countries	510.4	617.4	617.4	51.6	51.2	45.0	45.1	45.1	45.1	45.0	45.1	267.2	60.5	58.5	49.0	47.3	47.3	47.3

movement with the United States is so largely affected by the tonnage of passenger liners carrying mails or small part cargoes that little agreement can be expected between the shipping figures and the figures of value of goods carried. In the case of services to foreign countries in Eastern Asia, it may well be that goods carried on British ships as far as Singapore or Hong Kong are there transhipped to their further foreign destinations, and vice versa. Transhipment could account for the difference in the case of the inward movement from the Pacific Coast of South America, but there is agreement between the two sets of figures for the outward movement, and I do not know of any special circumstances likely to affect the one set of figures and not the other. The difference for the inward movement from the Pacific Coast of South America may, however, be balanced by the difference for the outward movement to foreign countries on the Atlantic Coast, the vessels proceeding round Cape Horn without cargo from this country for Chile and Peru after unloading cargo in the Argentine or elsewhere on the Atlantic Coast.

It is possible to apply the relationship shown by the two sets of figures in Table 4 with only a moderate margin of inaccuracy to the figures for 1931 given in Table 3. The greatest difficulty is in estimating the very important figure for imports from foreign countries in North America, owing to the wide difference between the 1931 figure for British entrances from that area (55.5 per cent.) and the proportion of about 37 per cent. in 1936 and 1937—the decline is mainly due to the inclusion since 1931 of a greater number of foreign liners calling for passengers and mails. Fortunately, however, the United States statistics mentioned below enable the proportion by value to be estimated with substantial accuracy at 72½ per cent. An estimate on this basis, in making which a conservative view has been taken in cases of doubt, gives the following result:—

TABLE 5.—*Estimated Value of Imports and Exports Carried in British Ships in 1931*

United Kingdom	Imports			Exports		
	Value	Carried in British ships		Value	Carried in British ships	
		Value	Proportion		Value	Proportion
Total	£ mill. 855	£ mill. 588	Per cent. 69	£ mill. 450	£ mill. 354	Per cent. 79
of which						
British Countries	241	229	95	182	179	98½
Foreign ..	614	359	58½	268	175	65

Summary.—It is now practicable to summarize the results of the estimates for 1913 and 1931 and of the recorded totals for 1936 and 1937, and this is done in the following table.

TABLE 6.—*Proportion by Value of Imports and Exports Carried in British Ships*

United Kingdom	Imports				Exports			
	1913	1931	1936	1937	1913	1931	1936	1937
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Trade with British Countries	97	95	93·4	92·4	99	98½	98·6	98·7
Foreign „	66	58½	51·6	51·2	64	65	60·5	58·5
Total ...	74	69	68·0	67·4	75	79	77·6	76·1

In the case of exports to British countries all but a negligible proportion have continued throughout the period under review to be carried by British vessels. The proportion of imports from British countries in British vessels is still high, but the decline since 1931 has been as great as between 1913 and 1931, and there was evidently an appreciable influx of foreign vessels into this trade in 1937, presumably as a result of British vessels being so fully occupied in that year of high employment for shipping. It is perhaps surprising that between 1936 and 1937 the decline in the share of British shipping was much less in respect of imports from foreign countries than from British countries. Previously this decline had, as already mentioned, been very marked, the fall in the proportion between 1931 and 1936 being roughly equal to that between 1913 and 1931. In the case of exports to foreign countries, British vessels seem to have held their own up to 1931, though if trade in coal were excluded, the British proportion would be seen to have declined somewhat. Since 1931 there has been a considerable decline in the proportion carried in British ships, and the fall between 1936 and 1937 was no less than 2 per cent.

Exports.—The decline in the British proportion of the carrying trade to foreign countries between 1931 and 1936 was not due to the increased importance of coal exports, in which trade British ships always have a relatively low proportion, since exports of coal to foreign countries formed 11·3 per cent. of the value of total exports to those countries in 1931 and 8·8 per cent. in 1936. In 1937 the proportion of coal to total exports rose to 9·7 per cent. and the tonnage carried in British vessels declined from 42·0 to 40·5 per cent. of the total. It is a reasonable assumption that the British proportion by value did not differ greatly from the proportion by ton-

nage; in so far as it differed in one year, it probably differed in much the same way the next year. Making this assumption, the aggregate figure for exports to foreign countries can now be analysed.

TABLE 7.—*Exports from the United Kingdom to Foreign Countries, 1936 and 1937*

Description of goods	Value		Carried in British ships			
			Value		Proportion	
	1936	1937	1936	1937	1936	1937
	£ mill.	£ mill.	£ mill.	£ mill.	Per cent.	Per cent.
Coal	24.0	32.1	10.1	12.8	42.0	40.5
Other United Kingdom goods	194.4	231.7	127.0	149.8	65.3	64.6
Imported merchandise ...	48.8	61.8	24.5	28.0	50.3	45.2
Total	267.2	325.6	161.6	190.6	60.5	58.5

The decline in the proportion of exports to foreign countries carried in British ships is thus seen to have been rather less for exports of United Kingdom goods other than coal than it was for total exports, while for re-exports it was substantially greater. The proportion for all exports other than coal is estimated (on the basis of the revised figures in Table 2) at 67 per cent. for 1913, which compares with 62.3 per cent. for 1936 and 60.5 per cent. for 1937.

Imports.—A similar analysis may be made for imports; in this case considerably more information is available. The value of the commodities for which it is possible to give details of the amounts carried by ships of different nationalities is about 43 per cent. of the total.

The commodities mentioned above are mostly carried in bulk, and it may be noted that for these imports the share carried by British ships declined more between 1936 and 1937 than it did for other goods imported. In the aggregate British ships carried 91.0 per cent. of the bulk cargoes imported from British countries in 1936, and this proportion declined to 89.4 per cent. in 1937, whereas for other imports from British countries the decline was only from 95.3 to 94.7 per cent. The contrast was less marked in the case of imports from foreign countries.

It will be observed that in 1936 British ships carried the same proportion of the bulk cargoes imported from foreign countries as of the other goods imported, 51.6 per cent., but that for imports from British countries the share of British shipping in the one case was appreciably lower than in the other—91.0 per cent. for bulk cargoes

TABLE 8.—*Imports into the United Kingdom, 1936 and 1937*

Description of goods	Value		Carried in British ships			
			Value		Proportion	
	1936	1937	1936	1937	1936	1937
	£ mill.	£ mill.	£ mill.	£ mill.	Per cent.	Per cent.
<i>From British Countries</i>						
Grain	35.2	39.1	28.7	31.5	81.7	80.5
Feeding-stuffs for animals ...	3.4	5.0	3.1	4.7	92.2	94.4
Meat	29.3	35.1	29.2	35.1	99.6	99.7
Sugar	9.2	14.4	8.6	13.2	92.9	92.1
Oil seeds, nuts and kernels ...	10.1	12.4	8.5	9.9	84.1	80.2
Wood and timber	8.5	12.0	5.7	6.6	67.1	55.5
Cotton	9.5	9.9	9.1	9.1	96.1	92.2
Wool	37.0	41.3	36.5	41.0	98.8	99.2
Iron ore and scrap	0.5	1.0	0.4	0.9	87.2	89.5
Petroleum	2.5	2.6	2.3	2.4	89.2	91.8
Other goods	183.0	227.8	174.5	215.7	95.3	94.7
Total	328.2	400.6	306.6	370.1	93.4	92.4
<i>From Foreign Countries</i>						
Grain	27.5	42.8	14.5	24.7	52.8	57.8
Feeding-stuffs for animals ...	5.1	6.4	3.0	3.8	58.9	60.1
Meat	49.3	51.9	29.9	38.8	60.6	74.7
Sugar	5.8	6.0	3.9	3.9	66.4	64.6
Oil seeds, nuts and kernels ...	4.1	5.1	2.1	2.4	51.4	46.5
Wood and timber	35.0	49.9	4.0	5.0	11.4	10.0
Cotton	36.3	38.8	25.4	22.7	70.0	58.5
Wool	8.7	10.8	7.1	8.6	81.9	79.2
Iron ore and scrap	7.8	11.7	3.0	4.2	39.1	35.5
Petroleum	34.5	45.1	17.7	23.0	51.3	51.0
Other goods	296.3	348.9	152.9	179.1	51.6	51.3
Total	510.4	617.4	263.5	316.2	51.6	51.2

as compared with 95.3 per cent. for other goods. This is due very largely to the comparatively small part British shipping plays in the carriage of timber. In 1937 this was only 55.5 per cent. for imports from British countries, the next lowest proportion for bulk cargoes exceeding 80 per cent., while British vessels carried only 10 per cent. of the imports of timber from foreign countries. British vessels carry also a low proportion of the iron ore and scrap imported—about 40 per cent. On the other hand, they carry practically all the meat and wool from British countries and a high proportion of the meat and wool from foreign countries. In the case of meat from foreign countries the high proportion is due to British vessels carrying practically the whole of the meat imported from South America, while as regards wool the lowest proportion for any important country is about two-thirds in the case of France. The high proportion of cotton brought from foreign countries in British vessels is due to our carrying the bulk of the cotton from Egypt.

Nationalities of Vessels.—A fact made very clear by these new statistics of the Board of Trade is the great extent to which the carrying trade between this country and any other with an appreciable mercantile marine is carried in the vessels of the two countries. This is illustrated as well by the figures of 1936 as by those of 1937; the table includes all those countries the aggregate trade with which exceeded £15 million in 1936.

TABLE 9.—*Nationality of Vessels in the Carrying Trade of the United Kingdom, 1936*

Country of consignment	Imports			Exports		
	British	Nationality of country of consignment	Other nationalities	British	Nationality of country of consignment	Other nationalities
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
British Countries ...	93.4	—	6.6	98.6	—	1.4
Argentine Republic ...	83.0	0.1	16.9	96.0	0.5	3.5
Belgium ...	71.6	14.6	13.8	80.7	13.0	6.3
Denmark ...	10.0	88.6	1.4	40.8	46.0	13.2
Egypt ...	76.1	13.3	10.6	95.1	1.2	3.7
Finland ...	6.0	56.2	37.8	6.0	82.7	11.3
France ...	66.5	23.7	9.8	62.6	28.1	9.3
Germany ...	45.4	34.2	20.4	39.8	48.5	11.7
Netherlands and Dutch West and East Indies ...	47.0	34.8	18.2	46.2	51.8	2.0
Norway ...	22.0	73.7	4.3	26.5	69.8	3.7
Poland ...	24.2	29.5	46.3	30.3	54.0	15.7
Soviet Union ...	14.2	52.0	33.8	21.4	71.7	6.9
Sweden ...	17.7	71.9	10.4	38.6	53.2	8.2
United States ...	52.4	34.1	13.5	59.9	36.8	3.3

As will be seen, the proportions carried by vessels of "other nationalities" vary considerably from country to country, but are for each country except Denmark higher for imports than for exports. The high proportion in the case of imports from Poland, Finland and the Soviet Union is due to British vessels entering so little into the timber trade of those countries. The rather high proportion in the case of imports from Germany is mainly due to Dutch vessels, which carried 15 per cent. of the goods from Germany, as a result doubtless of these goods being shipped from Dutch ports. This applies also to exports. The trade of the Dutch East and West Indies has been included with that of the Netherlands, and the somewhat high proportion shown for imports from the combined area is very largely due to Norwegian vessels carrying one-third of the imports from the Dutch West Indies, which consist almost entirely of petroleum. On the export side the somewhat high proportion of goods carried by vessels of "other nationalities" in the

case of Poland is due in large measure to half the exports of food-stuffs—essentially herrings—being carried in Norwegian vessels. In the case of Denmark and Finland the relatively high proportion is due mainly to about one quarter of the coal exported to those countries being carried in vessels belonging to other Scandinavian countries, principally Sweden, while Finnish and Norwegian vessels carry an appreciable part of the coal exported to Sweden. The other Scandinavian countries also carry the bulk of the imports from Denmark, Norway, Sweden, and Finland not carried in national vessels. The figures for 1936 are summarized below.

TABLE 10.—*Trade of the United Kingdom in 1936 distinguishing Goods Carried in Vessels belonging to the Country of Consignment*

—				British vessels	Vessels of nationality of country of consignment	Other vessels	Total
				£ mill.	£ mill.	£ mill.	£ mill.
<i>Imports</i>							
British Countries	...	...	...	306.6	—	21.6	328.2
Foreign	„	...	...	263.5	148.3	98.6	510.4
Total	...	...	...	570.1	148.3	120.2	838.6
<i>Exports</i>							
British Countries	...	...	...	214.5	—	3.1	217.6
Foreign	„	...	...	161.6	82.5	23.1	267.2
Total	...	...	...	376.1	82.5	26.2	484.8

In the trade with foreign countries in 1936, vessels belonging to the country of consignment carried 29 per cent. of the imports and 31 per cent. of the exports. Vessels neither British nor belonging to the country of consignment of the goods carried imports from British and foreign countries valued at £120.2 million (14.3 per cent.) and exports valued at £26.2 million (5.4 per cent.). The nationalities primarily engaged in this trade, indirect so far as they are concerned,

Nationality of vessels				Imports	Exports	Total
				£ mill.	£ mill.	£ mill.
Norwegian	...	...	...	28.7	5.0	33.7
Dutch	...	...	...	18.6	4.4	23.0
German	...	...	...	12.0	3.8	15.8
Danish	...	...	...	13.3	2.0	15.3
Swedish	...	...	...	9.2	1.7	10.9
Greek	...	...	...	10.5	1.0	11.5
Belgian	...	...	...	5.2	2.2	7.4
Other nationalities	...	...	...	22.7	6.1	28.8
Total	...	...	...	120.2	26.2	146.4

The very high figure for imports carried in Norwegian vessels in the trade with countries other than Norway is due very largely to tanker tonnage—Norwegian tankers brought one quarter of the total quantity of petroleum imported into this country, this being worth about £10 million. The indirect trade carried by vessels of other nationalities is more widely scattered, except for Greek vessels, which are concentrated mainly in the grain trade. Greek vessels brought about 12 per cent. of the grain imported in 1936, the value being probably about £6 million. The value of the goods they brought from Greece was less than £100,000.

The General Trend.—Table 6 shows the proportion by value of imports into and exports from the United Kingdom carried in British ships in four selected years. While estimates have not been made for other years, the British proportion of tonnage entered and cleared with cargo furnishes a rough guide as to the trend.

TABLE 11.—*British Proportion of Tonnage Entered and Cleared with Cargo at Ports in the United Kingdom, 1913 and 1924–1937*

Year	Entered from		Cleared to	
	British countries	Foreign countries	British countries	Foreign countries
	Per cent.	Per cent.	Per cent.	Per cent.
1913	93.5 (97)	59.6 (66)	95.2 (99)	53.8 (64)
1924	92.2	57.4	94.2	55.5
1925	92.8	59.6	94.5	58.0
1926	94.1	60.5	96.5	63.2
1927	93.0	58.6	93.7	58.3
1928	93.6	57.9	94.5	59.0
1929	94.9	55.8	93.3	58.2
1930	92.6	55.1	93.0	56.3
1931	90.2 (95)	54.6 (58½)	93.7 (98½)	56.5 (65)
1932	90.1	49.7	93.0	52.9
1933	89.1	47.8	94.4	50.3
1934	88.0	47.2	93.5	49.8
1935	87.7	45.6	93.7	48.7
1936	88.0 (93.4)	45.0 (51.6)	93.9 (98.6)	49.0 (60.5)
1937	86.3 (92.4)	45.1 (51.2)	94.6 (98.7)	47.3 (58.5)

Notes. (1) Shipping movement with the Irish Free State has been omitted throughout.

(2) The figures given in brackets for the years 1913, 1931, 1936 and 1937 relate to the proportion by value of imports and exports carried in British ships (see Table 6).

The British proportion of entrances with cargo from British countries was highest in 1929, but apart from this there was no significant change from the pre-war proportion till 1931, when the decline, which is still going on, commenced. As regards clearances to British countries, nothing need be said, except to call attention to the wholly abnormal figure for 1926. That, it will be remembered,

was the year of the general strike and of the coal stoppage, which lasted from May to December, and resulted in our importing coal from foreign countries. Doubtless foreign vessels normally bunkering here and taking on board some cargo at the same time were unable to do so, but this cannot have affected appreciably the 1 per cent., which represents the normal share of the total exports to British countries carried in foreign vessels.

The year 1926 was also the year in which there was the highest British proportion of tonnage entered and cleared to foreign countries, but whereas for entrances this showed little change from previous years, for clearances it was 63·2 per cent., the next highest proportion in any year being 59·0 per cent. This doubtless genuinely represented a quite abnormal proportion by value of exports carried in British ships, being due to the cessation of coal exports, which, as already mentioned, are carried to a much greater extent in foreign vessels than other exports.

From 1926 to 1936 there was an unbroken decline in the British proportion of tonnage entered from foreign countries, and probably also in the British share of the carrying trade to this country. The most striking fall occurred between 1931 and 1932—from 54·6 to 49·7 per cent.—and this may be attributed to the protectionist policy of the country, which resulted in a striking decrease in imports from foreign countries, and a not unnatural preference of those foreign countries to ship goods in their own vessels.

Up to 1931 the pre-war proportion of exports to foreign countries carried in British ships appears to have been appreciably exceeded, the trend being upwards till 1928 and downwards subsequently. This rise was due, as already indicated, to the reduced importance of coal exports. As in the case of imports, the general reduction in trade with foreign countries in 1932 resulting from the altered tariff policy caused a considerable reduction in the share of exports to those countries carried in British ships. This reduction is still continuing, there being appreciable decreases in both 1933 and 1937 as well as in 1932.

Ballast Voyages.—The Departmental Committee on Shipping and Shipbuilding called attention in their report to the fact that “the avoidance of ballast voyages is an indication of ability to own and manage shipping, and it was one of the chief factors in British marine prosperity”. With a view to seeing whether the advantage which British vessels then had in this respect still continues, the following comparative table has been prepared.

The position has radically changed since 1913. In those days the tonnage cleared with cargo was nearly 40 per cent. greater than the tonnage entered. Nowadays it is normally over 10 per cent.

TABLE 12.—*Proportion of Net Tonnage of British and Foreign Vessels Entered and Cleared at United Kingdom Ports in Ballast, 1913 and 1937*

Area	Total tonnage entered and cleared		Proportion in ballast							
			Entered				Cleared			
			1913		1937 *		1913		1937 *	
	1913	1937 *	British vessels	Foreign vessels	British vessels	Foreign vessels	British vessels	Foreign vessels	British vessels	Foreign vessels
	Million tons net		Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Northern Europe ...	67.5	66.2	58.5	56.8	43.8	33.8	24.0	30.0	39.2	45.9
Europe (Atlantic) and Western Mediterranean Countries ...	30.6	34.1	43.2	52.5	32.9	63.1	13.0	11.6	25.1	47.9
Central and Eastern Mediterranean Countries ...	13.1	6.1	32.4	69.9	30.9	5.9	6.3	5.2	33.5	32.3
West and South Africa	3.6	4.7	3.9	31.5	9.0	13.0	1.8	21.9	29.9	24.9
East Africa, Persian Gulf, India ...	5.6	9.1	3.2	25.0	2.7	5.8	2.4	32.3	30.6	24.1
Eastern Asia and Australasia ...	6.1	9.4	3.0	35.3	1.3	0.1	1.5	13.1	10.5	17.5
North America—Atlantic Coast ...	21.1	28.2	1.3	21.1	5.1	7.7	21.6	32.1	17.5	21.0
West Indies and Central America (Atlantic Coast) ...	2.1	8.8	0.9	31.5	0.6	1.0	30.3	30.2	75.8	77.8
South America—Atlantic Coast ...	9.1	8.1	4.1	49.2	1.4	7.3	2.8	13.3	17.8	31.6
America—Pacific Coast ...	2.1	3.0	7.8	52.7	0.0	0.4	0.8	3.2	46.7	48.2
Total ...	161.5	177.7	30.7	52.8	20.6	28.8	11.0	23.0	30.1	42.1

* Excluding vessels trading with the Irish Free State.

less; the disparity in 1936 exceeded 15 per cent., and, that being abnormal, I have taken for comparison the figures for 1937, when the difference was under 13 per cent. One reason for this change is the decline in the value of exports relative to imports, but a reason of equal importance is the decline in the relative importance of coal exports, which require, value for value, a very much greater amount of shipping. It is this very important export trade which was largely responsible for 77 per cent. of the foreign vessels before the war departing laden, while only 47 per cent. brought cargo to this country—foreign countries sending their ships here empty to take away coal. Accordingly the pre-war figures for British or for foreign vessels cannot be compared with those of recent date, which necessarily show a lower proportion in ballast among the vessels entered and a higher proportion among those cleared; but it is practicable to consider the relationship between the proportion of British and of foreign vessels in ballast before the war and now.

The proportions are subject to one qualification, which may be of importance for certain areas, but may not greatly affect the aggregate. If a vessel calls at a port in this country to embark or disembark passengers only, it is recorded among the vessels in ballast, but a vessel bringing mails to or carrying mails from this country is recorded among the vessels with cargo. Should there have been a change in the allocation of mail contracts which resulted in foreign vessels formerly carrying passengers but not cargo to a country abroad, now carrying mails in addition, there might have been a relative decline in the proportion of foreign vessels in ballast. On the other hand, if foreign vessels now call here to embark or disembark passengers only to a greater extent than they did, this would increase the proportion of foreign vessels in ballast. The trans-Atlantic traffic is the most liable to be affected by this factor.

The table shows that in 1937, as in 1913, British vessels made relatively fewer ballast voyages than foreign vessels. So far as vessels coming to this country are concerned, the disparity between the British and foreign proportions in ballast has been much reduced since before the war, but the smaller proportion of foreign vessels coming here empty to load cargoes of coal is doubtless responsible for this. As regards clearances, there is still a considerable difference in the aggregate, foreign vessels undertaking, for a similar tonnage, 7 ballast voyages for every 5 by vessels under the British flag. Shipments of coal being mainly to European countries, I do not attach so much importance to the figures for voyages to these countries as to those for the longer ocean voyages. The former are also the voyages most likely to be affected by vessels calling here for bunkers, this factor being of considerably less importance now than before the war, owing to the substitution of oil for coal. In addition, vessels in ballast are recorded as entered from the last port of call and as cleared to the first, the reverse being the method adopted for recording vessels with cargo. Leaving aside the European areas, there are only three out of twenty areas (entrances or clearances) for which the proportion of British vessels in ballast in 1937 was higher than the proportion for foreign vessels, and in one of these the British proportion as well as the foreign was insignificant. The figures therefore seem to show that British vessels still have a definite advantage over foreign vessels in this respect so far as United Kingdom trade is concerned. The very high proportions of both British and foreign vessels cleared in ballast to the Pacific coast of North and South America and to the West Indies and Atlantic coast of Central America will be noted. As regards the former proportion, nearly one-half, there is very little cargo from this country to the Pacific coast of North America, while grain and timber are imported

in bulk from this area; the latter, about three-quarters, is due partly to tankers proceeding in ballast to bring home oil from the Dutch West Indies and Mexico, and partly to the substantial one-way traffic in bananas.

Tankers.—The growth of tanker tonnage since before the war is of interest as indicating one of the principal changes that has taken place in the carrying trade done by British shipping. Lloyd's Register publish particulars of tanker tonnage separately, and the following table has been compiled from their Register Book, supplemented by information obtained from the United States regarding the amount of their tanker tonnage employed in the coasting trade of the United States. This tonnage amounted to over two million tons last year, and it is important to exclude it when making comparisons of the tanker tonnage of different nationalities employed in international trade. Unfortunately this cannot be done for years in the table prior to 1929. The 1914 figures are not affected.

TABLE 13.—*Steam and Motor Oil Tankers in International Trade (excluding vessels under 1,000 tons gross)*

Year	World tonnage	Proportion under certain flags				Proportion of British tonnage % represented by tankers
		British	United States	Norwegian	Other	
	Million tons gross	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
1914	1.5	56.2	12.9	3.2	27.7	4.4
1919	2.9	46.8	41.5	2.3	9.4	7.9
1924	5.2	37.7	47.2	3.8	11.3	9.9
1929	7.0	34.2	34.0	11.2	20.6	11.3
	5.6	42.8	17.4	14.0	25.8	
1934	6.9	36.6	10.5	21.8	31.1	13.4
1938	8.3	36.2	4.6	23.7	35.5	15.9

* Excluding vessels under 1,000 tons gross.

The steady increase in tanker tonnage from 4.4 per cent. of the British ocean-going mercantile marine before the war to 15.9 per cent. last year is very striking. The table indicates that the recent growth in tanker tonnage of other nationalities has been even more rapid, the British share declining from 56 to 36 per cent. during the past 24 years. The American share, which was about one-fifth of the total 15 years ago, is now under 5 per cent. The growth in Norwegian tonnage was specially marked between 1924 and 1934. About one-eighth of the total British tanker tonnage is employed in the carriage of whale oil and molasses. The aggregate value of international trade in petroleum in 1936 (excluding trade over land boundaries) was about £190 million, and the British share of this

would be about £68 million, on the assumption that British tankers are operated at least as efficiently as foreign tankers and that we do not carry an abnormal share of the whale oil and molasses. Of this, about £20 million is the value of petroleum brought to this country in British vessels. The total of £68 million represents between 4 and 5 per cent. of the value of all goods carried in British ships, while the petroleum imported into the United Kingdom in British vessels was under 4 per cent. of the total imports in such vessels. Ton for ton, therefore, tankers carry a much smaller value of goods than other vessels, even if no allowance is made for the voyage in one direction being normally in ballast. In 1936 tankers earned about 10 per cent. of the gross earnings of United Kingdom shipping from the carriage of goods, this proportion comparing with 14 per cent. for gross tonnage, while tankers representing 12 per cent. of the British ocean-going mercantile marine carried about $4\frac{1}{2}$ per cent. of the value of all goods carried in British ships, excluding coasting voyages.

THE TRADE OF BRITISH COUNTRIES OVERSEAS

Empire—Empire.—The total value of imports into British countries other than the United Kingdom from other such British countries was £79 million in 1931 and £99 million in 1936, of which about £6 million in each year is estimated to represent trade between British countries in Africa not carried by sea.

The British proportion of the net tonnage of vessels entered with cargo in the ports of most of these countries in trade with the remainder is recorded. The proportion of inter-trade covered by these statistics represents 91 per cent. of the total in 1931 and 90 per cent. in 1936, if the figures for Australia are estimated from the corresponding figures of clearances in the most important parts of the Empire from which their imports are derived.

On this basis, the value of goods carried between British countries overseas by British vessels was £59 million in 1931, or $80\frac{1}{2}$ per cent. of the total, the corresponding figures for 1936 being £73 million and $78\frac{1}{2}$ per cent. The Departmental Committee estimated the corresponding pre-war proportion at 85 per cent. In doing this they used the figure of 80 per cent. for total entrances and clearances, and increased this to 85 per cent., on the ground that there were more foreign than British vessels in ballast. That is correct, but an examination of the available figures shows that too large an allowance was made for this factor and a figure more comparable with those for later years would be 83 per cent. The decline in the share of British shipping in the trade between British countries overseas appears, therefore, to have been rather greater between 1931 and 1936 than in the preceding 20 years. Adjusting the figures published by the

Departmental Committee to exclude Egypt, the value of goods carried in British ships in 1912 was £57 million.

Empire-Foreign.—The total value of goods carried by water between foreign countries and British countries other than the United Kingdom, as recorded in the trade returns of the British countries, amounted in 1931 to £502 million and in 1936 to £591 million.

Particulars are not available of the vessels entered and cleared in trade with foreign countries in different areas at ports in all the British countries overseas, but it will probably not result in appreciable error if conclusions are based on the particulars recorded for Canada, Newfoundland, South Africa, New Zealand, India, Ceylon, Malaya, Hong Kong, Jamaica, Trinidad and Tobago, Nigeria and Gold Coast, together with an estimate for Australia, representing together 87 per cent. of the total.

For Australia particulars are not published of British tonnage entered and cleared in the trade with different foreign countries, but an estimate can be made as follows, the figures given relating to 1936.

	£ mill.
Total imports into Australia	83.5
British vessels formed 70½ per cent. of the net tonnage entered with cargo, from which it is estimated that the value of imports carried in British vessels was about	58.9
Total imports from British countries into Australia	48.0
Value of these imports carried in British vessels:	
From United Kingdom (100 per cent.)	34.5
From other British countries (84 per cent.)*	11.3
	45.8

* Based on the tonnage of vessels with cargo cleared at ports in other British countries for Australia.

Accordingly of goods imported from foreign countries valued at £35.5 million, British vessels carried £13.1 million or 37 per cent. This includes the important trade with the United States, and the statistics of that country for weight of goods carried show 50 per cent. in British vessels in respect of imports from Australia and 49 per cent. for exports to Australia. Deducting trade with the United States gives a proportion of about 30 per cent. for the trade with other foreign countries.

For trade of British countries overseas with the United States the statistics of that country have been used for reasons which will appear later.

In the aggregate the proportion of the trade between British countries overseas and foreign countries carried in British ships declined between 1931 and 1936, the above figures based on shipping movement showing a decline from 39 to 37 per cent. We appear to

TABLE 14.—*Trade between British Countries Overseas and Foreign Countries Carried in British Ships, 1931 and 1936*

Foreign countries in	Imports into British countries			Exports from British countries		
	Total	Estimated amount carried in British ships		Total	Estimated amount carried in British ships	
	£ mill.	£ mill.	Per cent.	£ mill.	£ mill.	Per cent.
Europe						
1936	90.2 (67.2)	16.3 (12.1)	18	115.3 (100.6)	29.4 (25.6)	25½
1931	83.4 (66.5)	16.2 (12.9)	19½	100.0 (91.4)	31.4 (28.7)	31½
United States						
1936	63.3	31.6	50.0	92.6	47.0	50.8
1931	55.6	28.2	50.7	63.5	34.6	54.5
Latin America						
1936	9.7 (7.8)	3.8 (3.1)	39½	10.6 (10.1)	2.8 (2.6)	26
1931	7.1 (5.1)	3.1 (2.2)	43	10.0 (9.6)	3.5 (3.4)	35
Asia, Africa, etc.						
East Asia and Australasia						
1936	106.2 (98.8)	41.9 (39.0)	39½	83.6 (81.3)	35.1 (34.1)	42
1931	94.4 (91.4)	39.2 (37.9)	41½	77.2 (76.6)	33.2 (32.9)	43
Other areas						
1936	10.4 (6.8)	5.5 (3.6)	53	9.1 (6.0)	5.4 (3.5)	59
1931	8.1 (5.7)	3.8 (2.7)	48	8.2 (5.7)	3.9 (2.7)	47
Total—Asia, Africa, etc.						
1936	116.6	47.4	40½	92.7	40.5	43½
1931	102.5	43.0	42	85.4	37.1	43½
TOTAL						
1936	279.8	99.1	35.4	311.2	119.7	38.5
1931	248.6	90.5	36.4	258.9	106.6	41.2

Note.—The figures in brackets relate to the 13 countries mentioned above.

have lost little ground in the Empire trade with foreign countries in Asia and Africa, but appreciable declines are recorded for all the other areas, that for the United States being from about 53 to 50 per cent., for Europe from 26 to 22 per cent. and for Latin America from 39 to 33 per cent. For 1912 the Departmental Committee estimated the British share in this trade as a whole as 55 per cent., but this estimate, derived from a proportion of 49 per cent. for entrances and 52 per cent. for clearances of vessels with cargo and in ballast, does not appear to be justified by the available shipping statistics or on the basis of general considerations. The proportion for entrances with cargo was 46 per cent., more British than foreign vessels entering in ballast, while there was no significant difference between British and foreign vessels for clearances with cargo. The decline between 1931 and 1936 seems to have been comparatively small in relation to the decline in the preceding 20 years.

The estimated value of all goods carried in British ships between British countries overseas and foreign countries, as shown in Table 14, amounted to £197 million in 1931 and £219 million in 1936, the corresponding figure for 1912 being £187 million.

TRADE OF THE UNITED STATES

I have mentioned already that the United Kingdom is the only important country in the world producing at present statistics of the value of goods imported or exported in ships of different nationalities according to countries whence imported or to which exported. Statistics of this kind were compiled by the United States up to 1932, but the economic depression caused them to cease publication then, and it has not yet been resumed. The United States statistics enable a comparison to be made between the proportion of the carrying trade of that country done by British ships according as measurement is made by value of goods carried or by net tonnage of vessels with cargo. Table 15 gives such a comparison for the years 1927-32, the world being divided into three areas and trade with the British and foreign countries in those areas being shown separately. Water-borne trade only is taken into account, this including trade on the Great Lakes as well as trade by sea. The total figures are of less significance than those for British countries and foreign countries separately, as is evidenced by the figures for imports from Europe (including Mediterranean) in 1927. In that year the British proportion by net tonnage was smaller than that by value for both the British countries and the foreign countries, but owing to the different weighting by value and by net tonnage, the total figures show a substantially greater proportion by net tonnage than by value.

Some of these sets of figures show a definitely higher and others a definitely lower proportion when measured by net tonnage than when measured by value, but in others the relationship between the two proportions is not so clear. Cases in which the British proportion of the total trade when measured by net tonnage is definitely higher than the proportion by value are :—imports from British countries in the American continents, and exports to such countries and to British countries in Europe. The opposite relationship is shown clearly in the figures for imports from foreign countries in Europe and America and, with one negligible exception, foreign countries in Asia, Africa, and Australasia,* and exports to foreign countries in all three continental areas.

There remain to be considered imports from British countries in Europe and imports from and exports to British countries in Asia, Africa, and Australasia.* For these latter countries there is no fixed relationship between the two sets of figures, and the figures for 1931 contrast rather violently with those for 1929 for both imports and exports. The general movement seems to have been a rising British

* Excluding Mediterranean countries.

TABLE 15.—*Proportion of Water-borne Trade of the United States Carried in British Ships*

Year	Countries of consignment						Total			
	Europe (including Mediterranean)		America		Asia, Africa and Australasia					
	Proportion measured by		Proportion measured by		Proportion measured by		Proportion measured by			
	Value	Net ton- nage *	Value	Net ton- nage *	Value	Net ton- nage *	Value	Net ton- nage *		
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.		
<i>Imports</i>										
British Countries										
1927	79.1	76.7	45.3	50.2	58.4	56.9	63.5	58.8
1928	79.5	77.7	40.3	50.8	61.6	60.6	64.9	59.8
1929	80.3	76.9	51.4	54.0	62.7	65.8	67.1	61.9
1930	78.8	77.6	40.4	51.5	60.3	61.9	62.4	59.6
1931	72.6	76.6	43.9	55.2	60.1	51.4	60.5	60.3
1932	71.9	83.6	50.0	57.7	54.9	48.9	58.9	63.0
Foreign Countries										
1927	15.2	11.4	19.2	12.9	21.0	16.9	18.3	12.7
1928	14.3	10.0	21.6	13.1	23.1	13.2	19.5	11.9
1929	15.2	9.7	21.4	14.1	17.8	13.1	18.2	12.5
1930	13.2	8.8	18.9	13.0	19.9	13.0	17.2	11.4
1931	11.2	7.2	14.5	10.4	16.5	13.2	13.9	9.4
1932	9.6	6.9	12.1	8.2	17.7	17.8	12.9	8.6
Total										
1927	32.5	36.4	22.4	30.9	36.6	33.3	31.0	33.1
1928	31.8	35.6	23.9	31.0	38.2	32.3	31.6	32.7
1929	30.9	34.1	24.5	31.1	35.4	32.9	30.6	32.3
1930	28.2	31.9	21.9	30.6	35.0	31.5	28.5	31.1
1931	24.1	29.6	18.9	31.7	30.7	28.3	24.6	30.7
1932	21.3	27.9	18.2	30.9	27.4	29.3	22.2	29.8
<i>Exports</i>										
British Countries										
1927	63.0	72.6	43.4	57.8	68.3	56.2	60.8	62.5
1928	62.2	72.7	38.3	57.4	65.0	57.1	58.6	62.2
1929	61.4	70.6	41.0	57.6	63.6	61.7	58.5	62.0
1930	61.2	69.6	38.4	55.0	62.3	65.6	58.0	60.2
1931	59.1	70.1	44.4	57.9	58.5	61.3	56.5	61.4
1932	55.5	71.9	48.6	60.2	54.2	57.6	54.1	63.0
Foreign Countries										
1927	13.7	12.2	21.5	17.9	27.3	18.4	18.3	15.4
1928	13.2	11.1	22.6	16.7	27.3	18.2	18.5	14.5
1929	13.5	10.9	21.7	16.2	26.4	17.3	18.3	14.1
1930	11.3	9.4	19.2	13.0	27.8	16.9	16.4	12.0
1931	8.2	7.7	15.5	9.7	29.5	17.8	15.0	10.3
1932	8.0	6.8	11.3	6.0	32.1	17.0	15.2	8.2
Total										
1927	31.2	37.5	27.1	41.0	44.8	32.7	32.9	38.7
1928	30.4	36.4	26.4	40.9	41.2	30.9	31.7	38.0
1929	30.4	34.7	25.9	40.0	40.8	31.3	31.5	37.0
1930	29.4	33.1	23.4	37.5	40.7	30.7	30.2	35.1
1931	27.2	31.1	23.7	39.0	37.6	28.2	28.9	35.0
1932	25.1	29.6	21.8	38.3	38.0	26.9	27.8	33.9

* Net tonnage of vessels with cargo.

proportion for imports up to 1929 and a falling proportion subsequently, the movement shown by net tonnage figures being much more marked than that shown by the value figures. There was a similar movement for the British proportion of clearances, except that the highest proportion was in 1930, but the proportionate value of goods carried in British vessels from the United States to Asia, Africa, and Australasia declined year by year from 1927 to 1932. The latter was attributable mainly to American competition in the trade with Australia and New Zealand, and to the reduction in the relative importance of exports to these countries from 52 to 38 per cent. of the total exports to British countries in this continental area.

United States-United Kingdom.—Prior to the depression British ships were in the habit of carrying a somewhat greater proportion of the value of goods imported from British countries in Europe—essentially the United Kingdom—than would have been expected from the entrances of such vessels with cargo at United States ports. With the onset of the depression, while the British proportion of entrances was maintained, or in 1932 substantially increased, the proportion by value showed a marked fall. This maintenance of the British proportion by net tonnage was shown also in respect of clearances, as was the decline in the proportion by value. On the face of it the British ships in normal years either loaded more cargo per net ton than the foreign ships or carried a greater proportion of the more valuable goods from the United Kingdom to the United States, but the matter requires a more detailed examination. The proportions by value and by net tonnage are not strictly comparable, since some imports into the United States from the United Kingdom will be carried by vessels commencing their voyages in other countries, being recorded therefore in the United States shipping statistics as entered from that farther country except when the bulk of the cargo was loaded in the United Kingdom. The proportion of imports into the United States from the United Kingdom carried in vessels of nationalities other than British or American is quite small (under 5 per cent.), and the following table shows a comparison between the figures for British and United States ships.

With one exception the figures in the above table are probably roughly comparable, since United States vessels carrying cargo from this country to the United States in 1927-32 were generally recorded as entered from the United Kingdom, and it is probable that only a small proportion of the British vessels were recorded in our statistics for 1936 and 1937 as cleared for destinations other than the United States. The exception is in the figures for 1932, when the value per net ton rose for the United States vessels and continued to fall for the British vessels. The table shows an abnormal fall in the United

TABLE 16.—*Imports into the United States from the United Kingdom*

Year	British vessels			United States vessels			$\frac{a}{b}$
	Value of goods carried	Net tonnage with cargo	Value of goods per net ton (a)	Value of goods carried	Net tonnage with cargo	Value of goods per net ton (b)	
	Million \$	Thous. tons	\$	Million \$	Thous. tons	\$	
1927 ...	266.0	5,562	47.8	48.4	1,504	32.2	1.48
1928 ...	260.0	5,950	43.7	51.7	1,521	34.0	1.29
1929 ...	250.5	5,609	44.7	43.4	1,534	28.3	1.58
1930 ...	159.6	5,264	30.3	29.3	1,347	21.8	1.39
1931 ...	95.2	4,342	21.9	24.1	1,164	20.7	1.06
1932 ...	51.9	3,563	14.6	16.0	584	27.4	0.53
	£'000		£	£'000		£	
1936 * ...	21,500	3,098	6.94	13,216	1,515	8.72	0.80
1937 * ...	23,501	3,208	7.33	14,228	1,549	9.19	0.80

* Exports and clearances from the United Kingdom to the United States.

States tonnage, and a detailed investigation into the available statistics proves that this was due essentially to the American s.s. "Leviathan" changing her European terminal port from Southampton to Hamburg. At about the same time her net tonnage was changed from 27,676 tons to 15,796 tons. When such changes as that can occur, is it surprising that figures do not fit? As a result, the United States figures for 1931 include a tonnage of 380,000 tons for this vessel as entered from the United Kingdom, with no corresponding figure for 1932. On the same basis as in 1931, the United States tonnage entered from the United Kingdom would be increased to 863,000 tons net, the value of goods would be reduced to \$18.5 per net ton, and the figure in the last column of Table 16 would be increased to 0.79. This happens to be almost the identical figure for both 1936 and 1937, which do not need adjustment owing to the altered tonnage of the "Leviathan," as the vessel was not in service in those years. The British figures for 1936 and 1937 are affected by the voyages of the "Queen Mary," but even if this extra tonnage were eliminated and it were assumed that the vessel carried no cargo, which is absurd, the value of goods carried per net ton of British shipping in 1936 would still not be within 5 per cent. of the United States figure.

Up to 1930 the United States vessels carried less than 20 per cent. of the value of goods carried in British vessels from the United Kingdom to the United States; that proportion was increased in 1931 to 25 per cent. and in the following year to 31 per cent. This increase has gone on, and in both 1936 and 1937 the proportion had risen to about 61 per cent. This trade is evidently one of those in which British vessels have lost ground heavily in recent years, and it has

apparently been due not only to an actual decline in British tonnage—while United States tonnage is now as high as before the depression—but to the fact that per net ton of shipping United States vessels now carry a greater value of goods than British vessels, whereas previously British vessels had a definite advantage in this respect. The United States is unfortunately the only important country for which such a detailed analysis is possible; for others one has to rely on an estimate based on shipping movements, and the United States figures as well as those of this country show how unreliable it is possible for such a basis to be.

All Trades.—In the following table particulars are given of the total trade of the United States with different areas in 1931, and the amount carried in British ships, as recorded in the United States statistics, together with an estimate for 1936. The column headed "On original figures" is arrived at by applying the appropriate proportion of British net tonnage entered or cleared with cargo to the total value figures, and in the next column these figures are adjusted in accordance with the relationship shown to exist between the proportion measured by net tonnage of shipping and that measured by value. The value of the goods carried in British ships in trade with the United States before the war was not estimated separately by the Departmental Committee, but such figures are available and they are included in Table 17.

The table shows a great drop since 1912-13 in the proportion of United States trade carried in British ships, due in large measure to the rise in the American mercantile marine. Between 1931 and 1936 British vessels lost ground generally in trade with the United States except in trade between that country and two areas. In the trade with foreign countries in Asia, Africa, and Australasia, the share of British shipping increased, though not significantly, but there was a substantial increase in the proportion of goods carried in British ships between the United States and British countries in the American continents. The latter was due partly to the trade between the United States and Bermuda being in 1936 almost entirely in British hands, whereas in 1931 American and Dutch vessels were engaged in that trade to a considerable extent. British vessels are also taking a larger share of the trade between the United States and Canada. In the aggregate the share of British vessels in United States trade appears to have declined between 1931 and 1936 to only a small extent, but this is due to the greater relative importance in 1936 of the trade between the United States and British countries.

The proportion which British tonnage represented of the net tonnage entered and cleared with cargo at United States ports was 48·9 per cent. in 1912-13, 32·9 per cent. in 1931 and 32·8 per cent.

TABLE 17.—*Water-borne Trade of the United States and Value Carried in British Ships in 1912-13, 1931 and 1936*

Countries of consignment	1912-13			1931			1936			
	Total trade	Carried in British ships		Total trade	Carried in British ships		Total trade	Estimated value carried in British ships		
		Value	Proportion		Value	Proportion		On original figures	Adjusted	Proportion on adjusted figures
	£ mill.	£ mill.	Per cent.	£ mill.	£ mill.	Per cent.	£ mill.	£ mill.	£ mill.	Per cent.
British Countries										
United Kingdom				123.5	77.9	63.1	128.2 ^a	69.9 ^a	69.9 ^a	54.5
Other Europe (including Mediterranean) ...	179.1	165.9	92.6	2.2	0.3	15.1	2.5	1.9	0.4	15.0
America ...	30.3	12.4	41.1	45.3	20.0	44.2	47.5	31.3	25.4	53.6
Asia, Africa and Australasia ...	49.0	35.3	72.1	71.5	42.5	59.4	105.8	51.1	52.8	49.9
Total—British Countries ...	258.4	213.6	82.7	242.5	140.7	58.0	284.0	154.2	148.5	52.3
Foreign Countries										
Europe (including Mediterranean) ...	310.7	101.8	32.8	271.7	25.6	9.4	231.9	8.6	10.8	4.7
America ...	147.3	78.3	53.2	176.8	26.3	14.9	174.6	12.1	20.1	11.5
Asia, Africa and Australasia ...	58.6	28.4	48.4	162.5	36.4	22.4	160.7	31.3	37.8	23.5
Total—Foreign Countries ...	516.6	208.5	40.4	611.0	88.3	14.4	567.2	52.0	68.7	12.1
Total ...	775.0	422.1	54.5	853.5	229.0	26.8	851.2	206.2	217.2	25.5

^a United Kingdom statistics.

in 1936, these proportions comparing with those of 54.5, 26.8, and 25.5 per cent. given in the above table.

THE TRADE BETWEEN FOREIGN COUNTRIES OTHER THAN THE UNITED STATES

There remains to be considered the part British shipping plays in the carrying trade

(1) between foreign countries in Europe *;

(2) between foreign countries in Europe and

(a) Latin American countries,

(b) other foreign countries, mainly in Asia;

(3) between Latin American countries;

(4) between Latin American countries and foreign countries in Asia and Africa *; and

* Throughout the remainder of this paper the term "Europe" includes all countries in the Mediterranean, and the term "Asia and Africa" includes Oceania but not Mediterranean countries.

(5) between foreign countries in Asia and Africa, notably between China, Japan and the Dutch East Indies.

In all cases the available shipping statistics are largely inadequate; in respect of (3) and (4) they are scanty, and no shipping statistics are available for (5). In the absence of satisfactory information, the estimates made, both for 1931 and 1936, are given with due reserve. When added to the figures for the United States, which rest on a more secure basis, an estimate can be made of the share of British shipping in the total carrying trade between foreign countries with a reasonable degree of accuracy, and whether the absolute figure is correct or not, it can be seen in which of the two years British shipping had the greater share of the trade both terminals of which are in foreign countries.

(1) The trades between foreign countries in Europe are much the most important of those yet to be considered, but before any estimate can be made of the value of goods carried by British shipping it is necessary to ascertain about how much of this trade, valued at £1,461 million in 1931 and £1,060 million in 1936, represented goods carried by sea.

Comparatively few European countries distinguish the value of their imports by land and sea, and these unfortunately do not include such important countries as France, Germany, the Netherlands, and Italy. A further complication is that goods imported over a land frontier may have been sea-borne in earlier stages of their journey from the country of origin or of original consignment.

The only countries for which direct information is available are: Soviet Union, Estonia, Latvia, Lithuania, Poland, Belgium, Bulgaria, Turkey, Egypt, and French Morocco. In Norwegian statistics particulars of the land trade with Sweden have not been published separately since 1930, and the proportion recorded for imports in that year has been applied to the 1936 figures to obtain an estimate of the imports passing over the land frontier, the proportion in the opposite direction being applied to the Swedish statistics of imports from Norway.

For certain countries it has been possible to segregate imports through land custom-houses, but in some of these cases it appears that the areas covered by specified port custom-houses also include land frontiers in the vicinity—*e.g.*, Salonika in the Greek returns apparently covers the Serbo-Greek railway frontier traffic.

For the Central European countries it has been assumed that all imports from other continental countries except Spain and Portugal and the Scandinavian countries are land-borne (including river); goods carried by train ferry between Denmark and Germany or

Sweden or by rail from Denmark to Germany have, however, been treated as land-borne.

Then there are the countries for which only quantities over land frontiers are available, notably France and the Netherlands. For these two, the value of land trade has been estimated on the basis of the value of total imports of the commodities recorded by weight. The trade between France and Algeria has been excluded from the total of sea-borne trade, as this is regarded for shipping purposes as coasting trade.

Finally there are two important countries for which no details at all are available—viz., Germany and Italy. For these the only method available is to take the trade with limitrophe countries with no seaboard as land trade and to make estimates of the land-borne trade with maritime limitrophe countries on the basis of such information as can be culled from the returns of those countries.

For 1936, a detailed estimate has been made on the above lines, with the result that, out of the total of £1,060 million, the amount carried by sea is found to be about £455 million. The figures for 1931 which are readily available show that for nearly all the countries the sea-borne proportion of the total was smaller in 1931 than in 1936. Offsetting this to some extent is the fact that the sea-borne proportion of the trade of Italy in 1936 was abnormally low. The value of goods carried by sea between foreign countries in Europe in 1931 is estimated at £600 million out of the total of £1,461 million.

The available navigation statistics are those of the under-mentioned countries, the particulars shown relating to the net tonnage of vessels entered and cleared with cargo in trade with foreign countries in Europe.

Country	1931		1936	
	All flags	British	All flags	British
	Thous. tons	Thous. tons	Thous. tons	Thous. tons
Finland	4,427 *	103 *	5,060	213
Sweden	20,347	38	25,331	61
Denmark	11,480 †	239 †	8,109	106
Germany	21,390	990	23,800	875
Belgium	13,876	1,153	17,619	972
France ‡	63,005	10,633	50,996	9,241
Spain	18,222	607	17,228 *	456 *
Italy	16,493	644	15,605	431
Greece	7,828	354	7,432	722
Total	177,068	14,761	171,180	13,077

* 1934—the nearest year for which information is available.

† Including vessels in ballast.

‡ Excluding traffic between France and Algeria.

The important share of British shipping in the trade between France and other countries in Europe, including Egypt and other Mediterranean countries, is clearly shown by the above figures, the British proportion rising from 17 per cent. in 1931 to 18 per cent. in 1936. This proportion is, however, probably too high for the proportion of goods carried, as it includes a good deal of liner tonnage. In the aggregate the British proportion, on this basis, declined from about $8\frac{1}{2}$ per cent. in 1931 to 8 per cent. in 1936, and the value of the goods carried in British ships may be estimated at about £50 million in 1931 and £35 million in 1936.

(2) (a) The value of the trade between foreign countries in Europe and foreign countries in America apart from the United States was £212 million in 1931 and £236 million in 1936. The navigation statistics available are the same as for the European inter-foreign trades with the addition of those for Chile, and the particulars given below relate to the net tonnage of vessels entered and cleared with cargo in trade with Latin American countries (Europe in the case of Chile).

Country				All flags	British	All flags	British
				Thous. tons	Thous. tons	Thous. tons	Thous. tons
Finland	...	...	...	134 *	—	182	—
Sweden	...	...	...	770	105	676	19
Denmark	...	...	...	667 †	56 †	597	27
Germany	...	...	...	5,293	540	5,498	321
Belgium	...	...	...	3,589	687	3,669	467
France	...	...	...	19,772	5,604	16,742	5,338
Spain	...	...	...	7,593	1,046	7,292 *	1,293 *
Italy	...	...	...	2,320	188	2,331	107
Greece	...	...	...	48	10	124	—
Chile	...	...	...	1,120	57	1,032	91
Total	...	...	...	41,306	8,293	38,143	7,663

* 1934—the nearest year for which information is available.

† Including vessels in ballast.

These navigation figures show the British proportion to have been roughly 20 per cent. in each year. The British share, especially in 1931, was much more uniform between the various countries than in the inter-European trades. The high proportion for France, 28 per cent. in 1931 and 32 per cent. in 1936, will again be noted. On this basis, the value of the goods carried in British ships between foreign countries in Europe and Latin America may be estimated at about £42 million in 1931 and £47 million in 1936.

(2) (b) The value of the trade between foreign countries in Europe

and in Asia and Africa (excluding Mediterranean countries) was £186 million in 1931 and £238 million in 1936. The navigation statistics available are the same as for the European inter-foreign trades, and the particulars given below relate to the net tonnage of vessels entered and cleared in trade with foreign countries in Asia and Africa.

Country	1931		1936	
	All flags	British	All flags	British
	Thous. tons	Thous. tons	Thous. tons	Thous. tons
Finland	28 *	4 *	53	18
Sweden	114	12	378	95
Denmark	615 †	83 †	790	163
Germany	5,243	1,210	4,880	871
Belgium	3,564	795	3,487	627
France	15,153	2,497	18,343	3,364
Spain	4,424	173	3,552 *	53 *
Italy	2,643	208	2,996	128
Greece	70	1	83	2
Total	31,854	4,983	34,562	5,321

* 1934—the nearest year for which information is available.

† Including vessels in ballast.

In addition statistics for the Philippine Islands show that British ships carried 33 per cent. of the value of goods imported and exported in trade with foreign countries in Europe in 1931 and 24 per cent. in 1936.

According to these figures the British share was about 15 per cent. in each year, and the value of goods carried in British ships between foreign countries in Europe and in Asia and Africa may be estimated at about £28 million in 1931 and £36 million in 1936.

(3) The value of the inter-trade between Latin American countries in 1931 amounted to £48 million and in 1936 to £50 million. Of these totals about £18 million in each year consisted of crude petroleum carried from Venezuela to the Dutch West Indies in Dutch tankers. The only statistics available are those relating to entrances and clearances at ports in Chile, and the value of goods carried in ships of different nationalities to and from Cuba (latest year 1934) and St. Domingo. The trade of Chile is the most important of these, and the share of British ships in the trade with other Latin American countries was 20 per cent. in 1931 and 26 per cent. in 1936. The Cuban statistics show 19 per cent. for 1931 and 9 per cent. for 1934, while the Dominican statistics show $2\frac{1}{2}$ per cent. in 1931 and 9 per cent. in 1936. The trade is small, and the British ships' share in each

year may have been about 20 per cent. of the total, apart from that between Venezuela and the Dutch West Indies—say £6 million in 1931 and £7 million in 1936.

(4) The value of the trade between Latin American countries and foreign countries in Asia and Africa was only about £7 million in 1931, but it rose to £20 million in 1936, as a result mainly of a striking increase in Japanese trade with South and Central America. The statistics available are those mentioned in the preceding paragraph coupled with value figures for the Philippine Islands. In this trade, Cuba is more important than Chile, and the proportions shown by that country's statistics were 25 per cent. for 1931 and 23 per cent. for 1934. The proportions for Chile, St. Domingo and the Philippine Islands were smaller. The British ships' share in this trade was probably about £1 million in each year.

(5) The value of the trade between foreign countries in Asia and Africa amounted to £101 million in 1931 and £123 million in 1936, excluding the Japanese Inter-Imperial trade which is reserved to Japanese shipping as coasting trade. No statistics of any kind are available of the trade done by British ships between China and Japan or between these countries and the Dutch East Indies. The trade between Japan and Kwantung, valued at £17 million in 1931 and £22 million in 1936, is reserved to Japanese shipping, and in view of the great relative strength of Japanese shipping in this area, which has probably increased since 1931, the share of British shipping is not likely to have been large. British ships carried 12 per cent. of the trade of the Philippine Islands within this area in both 1931 and 1936. As a rough guess, I take a figure of £10 million in each year as the possible value of the trade carried in British ships.

Japanese navigation statistics show only the tonnage of vessels of various nationalities entered and cleared at each port, and do not distinguish any trading areas. They also have statistics showing the aggregate value of goods carried in vessels of each nationality. The British share of the total trade was rather over 12 per cent. in both 1931 and 1935 (the latest year for which information is available), the proportion for imports being between 13 and 14 per cent. and for exports about 11 per cent. Japan derived from the United Kingdom $1\frac{1}{2}$ per cent. less of her imports in 1935 than in 1931, but we took a similar proportion of Japan's exports in each year. Japanese trade with other British countries, however, represented $1\frac{1}{2}$ per cent. more of the total both of imports and of exports in the later year, and while we have substantially maintained our share in the total carrying trade of Japan, we have not increased it with the increase in trade between Japan and British countries.

Summary.—The following table summarizes the estimates made in the preceding paragraphs.

TABLE 18.—*Goods Carried in British Ships between Foreign Countries (excluding the United States), 1931 and 1936*

Trade	Sea-borne trade between foreign countries		Estimated share of British ships	
	1931	1936	1931	1936
	£ mill.	£ mill.	£ mill.	£ mill.
Europe—Europe	600	455	50	35
Europe—Latin America	212	236	42	47
Europe—Asia and Africa	186	238	28	36
Latin America—Latin America	48	50	6	7
Latin America—Asia and Africa	7	20	1	1
Between foreign countries in Asia and Africa	101	123	10	10
	1,154	1,122	137	136

To the above figures have to be added the corresponding particulars for the trade of the United States with foreign countries. The figures shown in Table 17 need adjustment as they are all taken from the United States side, and an addition must be made for freight and insurance on United States exports to arrive at their value as imports into foreign countries. The total figures for United States trade become £641 million in 1931 and £595 million in 1936, the corresponding figures for cargo in British ships being £93 million and £74 million. In 1931 the total value of imports into foreign countries from other foreign countries is estimated at £1,795 million, of which £230 million (nearly 13 per cent.) was carried in British ships; for 1936 the total was £1,717 million and the British share £210 million, or rather over 12 per cent.

The Pre-war Estimate.—This was arrived at by deducting from the total entrances and clearances of all vessels at foreign ports the entrances and clearances from or to foreign countries at ports in the United Kingdom and other British countries. Having arrived in this way at a proportion of 24 per cent. for British shipping with cargo and in ballast, it is stated in the Departmental Committee's report that "at a low estimate it is probable that the British proportion of vessels entering with cargo was not less than 28 per cent., whilst the proportion of trade carried by them between the countries in question probably exceeded 30 per cent." This method first of arriving at a proportion and then of boosting it up is open to question. Consider the figures for Brazil, Uruguay, and the Argentine, in each of which countries British shipping represented something like 40 per cent. of the total in 1911. A British vessel leaves the United

Kingdom and calls at Rio de Janeiro, Montevideo, and Buenos Aires, reversing the procedure on the return voyage. It is recorded in the United Kingdom statistics twice, once entered and once cleared, but is recorded as entered and cleared twice in the Brazilian and Uruguayan statistics and once in those of the Argentine. That is to say, the Committee have deducted twice the tonnage of the British vessel, whereas they should have deducted ten times the tonnage. This demonstrates the unsoundness of the method. Some addition may be necessary to figures derived from statistics of entrances and clearances of vessels with cargo to arrive at the share of the value of the goods which is carried in British ships, but an examination of the statistics of the fifteen foreign countries for which information is available for 1911 of the entrances and clearances of British ships in trade with other foreign countries, distinguishing between vessels with cargo and those in ballast, shows a rather lower proportion of British vessels for those with cargo than for the total with cargo and in ballast. The main part of the boosting up of the 24 per cent. to 30 per cent. is therefore unjustified.

The statistics of these fifteen countries, comprising the main European countries, the United States, Cuba, and the Dutch East Indies, show that for all vessels entered in 1911 the British proportion was 20 per cent., the proportion for vessels with cargo being 19 per cent. These statistics do not include the inter-trade between countries in South America or most of the trade in the Far East, in which British vessels probably enjoyed a considerably larger share; moreover, British vessels may have carried a greater proportion of the higher valued cargoes, and I think in the circumstances a fair estimate of the pre-war proportion would be 22 per cent. Accordingly, of the total of £1,587 million, representing the sea-borne trade between foreign countries in 1912, British ships are estimated to have carried about £350 million.

SUMMARY

For comparative purposes figures should be on a uniform basis throughout, and the figures given below accordingly differ in some respects from those included in earlier paragraphs, where, in order to arrive at the proportion carried in British ships, figures for exports have sometimes been used in place of figures for imports. The principal differences are that : (1) imports into Empire countries have been taken, where possible, instead of exports from the United Kingdom; (2) imports into other areas have been estimated, if necessary, by adding 10 per cent. for freight and insurance to the recorded value of exports to those areas; and (3) the figures for

United Kingdom trade in 1936 relate to total sea-borne trade, the figures given previously not including trade by parcel post.

The figures for trade between the United Kingdom and Empire countries and also the Empire-Empire and Empire-Foreign figures for 1912 are too small in relation to those for other years owing to the creation of the Irish Free State, and those for the United Kingdom-Foreign trade are too large. The aggregate difference is that represented by the sea-borne trade between the United Kingdom and the Irish Free State, which was 1.7 per cent. of the total world water-borne trade in 1931 and 1.1 per cent. in 1936.

The United States figures for 1912-13 mentioned above suggest that the value of goods carried in British ships in 1912 may be somewhat under-estimated, as account has been taken of the probability that British vessels carried a greater proportion of the high valued cargoes only in respect of a few of the figures included in the table. The same may be true, but to a smaller extent, in respect of the estimates for 1931 and 1936.

TABLE 19.—*Goods Carried in British Ships, 1912, 1931, and 1936*

Trade	Total imports by sea			Estimated share of British shipping					
	1912	1931	1936	1912	1931	1936	1912	1931	1936
	£ mill.	£ mill.	£ mill.	£ mill.	£ mill.	£ mill.	Per cent.	Per cent.	Per cent.
<i>Inter-Imperial</i>									
Empire-United Kingdom	186	241	329	180	229	307	97	95	93.4
United Kingdom-Empire	204	203	240	202	200	237	99	98½	98.6
Empire-Empire	69	73	93	57	59	73	83	80½	78½
Total	459	517	662	439	488	617	95½	94½	93.2
<i>Empire-Foreign</i>									
Foreign-United Kingdom	559	614	515	369	359	266	66	58½	51.6
United Kingdom-Foreign	448	295	301	287	192	182	64	65	60.5
Foreign-Empire	165	252	285	76	93	102	46	37	36
Empire-Foreign	214	279	333	111	114	127	52	41	38
Total	1,586	1,440	1,434	843	758	677	61	52½	47.2
Total trade of Empire	1,845	1,957	2,096	1,282	1,246	1,294	69½	63½	61.7
Foreign-Foreign	1,587	1,795	1,717	350	230	210	22	13	12
Total	3,432	3,752	3,813	1,632	1,476	1,504	47½	39½	39½

Note.—Egypt has been treated as a foreign country throughout and the mandated territories have been treated as British in 1931 and 1936.

A curious feature of Table 19 is that British ships carried a similar proportion of the total water-borne trade of the world in 1931 and in 1936, notwithstanding that for each of the trades for which separate estimates have been made the British share declined between those years. The change in distribution between the two years, shown in Table 21, is of course responsible for this. The year 1931 was an abnormal year in United Kingdom trade owing to there

being a wholly exceptional importation of goods from foreign countries in the autumn of that year in anticipation of the imposition of a general tariff. Subsequently the Ottawa Agreements have stimulated Inter-Imperial trade. The total sea-borne trade between foreign countries, in which British ships have a relatively small share, was some 4 per cent. less in value in 1936 than in 1931, whereas there was a considerable increase between those years in the value of the total trade of the British Empire.

The British proportion of world shipping in 1912, 1931 and 1936 is shown in Table 20, the figures being those compiled by Lloyd's Register of Shipping.

TABLE 20.—*Gross Tonnage of Vessels in 1912, 1931 and 1936*

Year	Steam, motor and sailing			Steam and motor					
	100 tons gross and over			100 tons gross and over			1000 tons gross and over		
	World	British	British proportion	World	British	British proportion	World	British	British proportion
1912	Mill. tons	Mill. tons	Per cent.	Mill. tons	Mill. tons	Per cent.	Mill. tons	Mill. tons	Per cent.
1931	44.6	19.9	44.6	40.5	19.2	47.4	not available	not available	not available
1936	70.1	23.4	33.3	68.7	23.1	33.7	63.8	21.4	33.5
	65.1	20.4	31.3	64.0	20.2	31.5	59.1	18.5	31.2

For pre-war years the carrying trade done by sailing ships cannot wholly be neglected, and the British proportion of tonnage engaged in the carrying trade between different countries was probably rather less than the 47.4 per cent. proportion for steam and motor vessels only. The British proportion of the larger vessels, over 1,000 tons gross, is not available for any pre-war year. Before the war British vessels would appear to have carried a slightly higher proportion of water-borne trade than they represented of world shipping. The difference for 1931 was more marked, 39½ per cent. as compared with 33½ per cent., while an even larger difference existed in 1936, 39½ per cent. as compared with 31¼ per cent. There is not much doubt about the recent figures; the pre-war figures are more conjectural, but even so it is hardly open to question that British vessels have increased in efficiency during the past quarter of a century to a greater extent than their foreign competitors, if relative efficiency be measured by value of goods carried per ton of shipping available for employment.

The distribution of the carrying trade of British shipping is shown in the following table, with some comparative figures for earnings in 1931 and 1936.

TABLE 21.—*Geographical Distribution of British Carrying Trade and Earnings*

Trade	Proportion by value of goods carried in each trade			Proportion of gross freight earned by British shipping		
				Including	Ex- cluding	
				Passage money and coasting freight *		
	1912	1931	1936	1931	1936	1936
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
<i>Inter-Imperial</i>						
United Kingdom—Empire	23½	29	36	38·2	38·8	39·2
Empire—Empire	3½	4	5	10·5	7·7	4·0
Total	27	33	41	48·7	46·5	43·2
<i>Empire—Foreign</i>						
United Kingdom—Foreign	40	37	29½	29·0	25·2	27·3
Empire—Foreign	11½	14	15½	11·6	13·6	13·7
Total	51½	51	45	40·6	38·8	41·0
Total trade of Empire	78½	84	86	89·3	85·3	84·2
Foreign—Foreign	21½	16	14	10·7	14·7	15·8
Total	100	100	100	100·0	100·0	100·0

* Earnings in carrying goods coastwise in oversea British and foreign countries.

The proportions given in the first two columns for earnings are taken from Dr. Isserlis's paper already referred to; they are based on a 44 per cent. sample in 1931 and a 73 per cent. sample in 1936 of the earnings of vessels owned in the United Kingdom. The figures discussed hitherto relate, of course, to British vessels wherever registered. The sample in 1931 is rather small, and it suffers from the defect, for purposes of comparison with the figures relating to value of goods carried, that it includes receipts from the carriage of passengers not domiciled in the United Kingdom, and also from the carriage of goods coastwise in oversea British and foreign countries. These receipts are properly included for the purpose of the balance of payments, but it was realized after the first enquiry that a rather more detailed analysis of the figures by shipowners would enable the figures to serve other purposes, and this the great bulk of owners agreed to do when the enquiry into shipping earnings was repeated for 1936. As a result, the final column in the above table is much

more comparable with the proportion by value of goods carried in British ships in the various trades. It cannot be completely comparable, because it omits both the earnings of British vessels owned outside the United Kingdom and the earnings of a large part of the passenger liners. The proportions for trade between British countries overseas, 7·7 per cent. and 4·0 per cent. including and excluding the earnings in the coasting trade, show what an important part of the earnings of United Kingdom shipping is derived from this coasting trade, while passage money is also important. This rather destroys the significance of the very high proportion (10·5 per cent.) recorded for 1931 for the oversea Inter-Imperial trade. It does not seem to me that the sample for 1931 can be regarded as sufficiently representative to base any conclusions thereon, but the amended 1936 figures are so good a fit with the estimate made of the distribution of the value of goods carried in British ships that the two sets of figures may be regarded as supporting one another. It will be noted that for both Empire-Empire and Empire-Foreign in the above table the earnings of United Kingdom shipping are a smaller proportion of the total than that shown by the value of goods carried. Since these are trades in which British vessels owned outside the United Kingdom might be expected mainly to engage, that is to be expected. The similar somewhat lower proportion for United Kingdom-Foreign is probably attributable to goods being carried in these trades a shorter average distance than in other trades, coupled with the inadequate representation of the transatlantic passenger liners in the statistics of earnings. With these reasons for certain lower proportions, the two higher proportions are self-explanatory.

Weight of Goods.—The following table contains such information as is available concerning the weight of goods carried in British ships in 1936.

The particulars, it will be observed, are very incomplete, covering but a small proportion of world trade. About half the total of sea-borne imports and exports shown in the table is represented by the trade of the United States and Canada. In the aggregate the figures for the remaining countries amount to 29·5 million tons; the total estimated from the navigation figures is 28·6 million tons. The latter figures are inadequate in the case of Iran, since information is not available regarding vessels with cargo, while the figures for the weight of exports from the Union of South Africa include bunker coal. Apart from Canada and the United States, there is nothing to indicate that estimating the proportion of world trade carried in British ships from the weight of goods carried would give a figure substantially different from figures based on entrances and clearances of vessels with cargo. The figures for the Great Lakes are roughly the

TABLE 22.—*Weight of Water-borne Imports and Exports Carried in British Ships in 1936*

Country	Imports in British ships		British proportion of net tonnage entered with cargo	Exports in British ships		British proportion of net tonnage cleared with cargo	Total weight of cargo in British ships	
	Weight	Proportion of total		Weight	Proportion of total		As recorded	Estimated from shipping figures
	Mill. tons	Per cent.	Per cent.	Mill. tons	Per cent.	Per cent.	Mill. tons	Mill. tons
United States—ex. Great Lakes	6.6	20	27	6.3	20	27	12.9	17.5
United States—Great Lakes	3.9	82	77	6.7	80	75	10.6	10.0
Canada—ex. Great Lakes	5.2	52	65	9.1	61	66	14.3	16.0
Australia	3.6	66	71	4.0	65	70	7.6	8.2
Iran (Persian Gulf ports)	0.2	50	81 *	5.7	86	81 *	5.9	5.6
Union of South Africa	2.8	63	65	2.5 †	70	65	5.3	5.3
Egypt (not including transit)	1.8	46	44	1.1	40	44	2.9	3.0
Spain and Balcaric Isles (1934)	0.7	14	12	1.5	24	14	2.2	1.5
Italy	1.6	10	8	0.1	2	6	1.7	1.4
Denmark	1.5	13	9	0.2	8	4	1.7	1.1
Philippine Islands	0.5	28	29	0.5	23	29	1.0	1.1
Canary Islands and Spanish North Africa (1934)	0.4	24	25	0.2	14	25	0.6	0.7
Greece	0.3	10	11	0.1	10	13	0.4	0.4
Yugoslavia (1935), Estonia and Bulgaria	0.1	7	9 ‡	0.1	6	9 ‡	0.2	0.3

* Based on figures including vessels in ballast.

† Including bunker coal loaded. Total is 1.2 million tons; British share not stated.

‡ Partly based on figures including vessels in ballast.

same by either method, but for other trade of Canada and the United States British ships carry a considerably smaller proportion of the weight of imports and exports than would be estimated from the shipping figures. For the United States including the Great Lakes British ships carried 30.1 per cent. of the weight of imports and exports in 1936, the shipping figures would give a proportion of 32.8 per cent., while Table 17 based partly on the shipping figures shows a proportion by value of 25.8 per cent. The Departmental Committee expressed the view that British vessels carried a smaller proportion of the total weight of goods passing in oversea trade than of the total value of such goods. Such investigation as it has proved possible to make into this statement does not tend to confirm it, but the sample available is clearly inadequate to justify any precise conclusion.

This paper does not purport to deal with the whole of the carrying trade of British shipping. In addition to the work of British ships in carrying goods from country to country, the carriage of goods coastwise, particularly in the coasting trade of the United Kingdom, the Dominions and India, affords employment to many British vessels;

the value of such goods is practically never recorded, but statistics relating to weight are available for some countries. The separation of Burma from India in 1937 is important in this connection, trade between these two countries, necessarily regarded as coasting in this paper, having now become international.

In conclusion, I should like to express my thanks to my colleague, Mr. H. C. Craft, a Fellow of this Society, who, with his comprehensive knowledge of the trade statistics of foreign countries, has rendered me great assistance in the preparation of this paper, particularly in compiling the estimate of the sea-borne trade of Europe.

Note.—I have some tables showing the detailed distribution into about ten areas in each case of the imports and exports in 1936 in (1) Inter-Imperial trade, (2) Empire-Foreign trade and (3) Inter-Foreign trade, copies of which I shall be pleased to supply on request to any Fellow who is interested.

DISCUSSION ON MR. LEAK'S PAPER

SIR ALFRED FLUX spoke of his good fortune in being present at a meeting of the Society at which Mr. Leak had introduced the topic of the carrying-trade done by British ships. It was a very broad topic, and the particular points that he had in mind to speak about before Mr. Leak read the paper had been thrust very much into the background by Mr. Leak's own admirable selection of points. The paper was very interesting to him for two reasons. It marked the achievement of a new basis from which to reckon. The recording of the particulars of goods carried into and out of this country, so as to show the nationality of the ships in which they were carried had been far too long delayed, and he was inclined to stress even more than Mr. Leak had done the danger of relying too much upon such estimates as were possible before the records now available came into existence. The corrections in the earlier estimates, which Mr. Leak had been able to make, might, perhaps, not have gone so far as would be justified if more complete facts had been available. Those estimates rested on the hazardous assumption that tonnage cleared or entered with cargo serves as an index of the goods carried to or from different countries.

What had given him particular satisfaction in the careful work Mr. Leak had done was that the account of the situation with regard to the carrying-trade was cheerful rather than dismal. Instead of the trade slipping out of British hands owing to the tremendous extent to which, since the war, other countries had striven to increase their own merchant shipping, it was pleasant to learn that our fellow-countrymen were able to stand up in this very keen contest and so nearly to hold their own. The fact that other countries, urged on by their war-time experience, had endeavoured to go as far as possible towards self-sufficiency in the matter of the carrying-trade, had necessarily brought about a great deal of keen competition, but Great Britain had, it appears, been able to meet it to better purpose than was often supposed.

He believed they were fully justified in accepting the revisions which Mr. Leak suggested should be made in the earlier estimates. In the days to which those estimates referred they were working very much in the dark. Even now they were in doubt on some of the points, but Mr. Leak had shown that they would not be justified in lamenting that they had lost so much as the first comparison of the figures suggested.

One had long wished for some more rational measure of the British carrying-trade and its relative importance to that of other countries. Plans had been prepared for international work in this field, but they had encountered the same obstacle as in certain other great trading countries—namely, that it did not appear worth while to those engaged in the shipping business to supply the needed-additional information. A new way of evading that obstacle to sound statistics was a matter for great satisfaction, and those who had spent any considerable time in handling the statistics of trade would agree with him that the fact that Mr. Leak had so expeditiously brought forward the results of the new figures at his disposal justified an expression of their most sincere thanks to him. The paper was an impressive one, alike in the material of various kinds which it embodied, in the extent to which the different phases of the problem had found illustration, and in the indication of certain points regarding which they might hope that a more complete view of the problem would be possible in the course of a few years. He had much pleasure in moving the vote of thanks to the reader of the paper.

DR. ISSERLIS, in seconding the vote of thanks, said he had a strong feeling of sympathy for the author of the paper. Mr. Leak was in very much the same position as himself. Both of them had their masters, and it was the custom of those masters to ask the statistician to give them one figure, and when that one figure was given they turned upon the statistician and rent him. They understood their own particular section, each of them, and their trade very well, and they said, "This one figure that you have produced does not fit in with what we ourselves know of our section." It was very much like what happened to their colleagues in other branches of statistical science. They were asked, for example, to give a death-rate in a single figure, but those who handled vital statistics seemed able to manage their affairs a little better, and they were able to persuade their clients that the single figure they asked for ought to be qualified, and that they ought to have death-rates for sexes, for ages, and so forth, allowance having to be made for all these things.

The present paper was an example of the quest for a single figure. It set out to answer the question as to what was the British share of the world's carrying-trade by sea. Statisticians would see at once the difficulty of determining what was to be included in the world's carrying-trade. If as a result of political changes the total number of independent political states in the world were reduced by 50 per cent., the material which would enter into international trade statistics, whether carried by land or sea, would be at once enormously reduced. On the other hand, the British shipowner whose

ships carried goods between two ports in China or between Burma and India obviously felt that he was taking an important share in the world's carrying-trade by sea, though records of the goods he carried did not enter into international trade statistics.

However it was defined, when one spoke of the share of British shipping in the carrying-trade of the world, difficulties again cropped up. What was to be included, for example, in total world shipping and in total British shipping? When dealing with the constituent parts of anything to be measured, a common unit is desirable. Should the trade carried be measured in tons, in ton-miles, by the value of the cargo, or by the freight earned? This last, as had been indicated by Mr. Leak, would probably be the best single theoretical solution. But the difficulty remained of how to add in one and the same total, say, 300,000 wireless valves with a total weight of 15 tons and a total value of £60,000, carried 12,000 miles from the United Kingdom to Australia, 60,000 tons of coal, value also £60,000, carried 1,000 miles from England to Esthonia; 130,000 lb. of tea, value £17,000,000, carried 8,000 miles from India to Great Britain, and 1,500,000 tons of wheat, value £12,000,000, 12,000 miles from Australia. Finally, they would have to add 3,000 passengers carried in the *Queen Mary*, 3,000 miles from England to the United States, and 500 emigrants carried on deck from Bombay to Jedda.

Owners of 4 million tons of tramp shipping naturally thought in terms of tons of grain from the Plate, Australia or the Gulf to Europe, or coal from the United Kingdom to the Mediterranean. Not so the owners of 9 million tons of cargo liners or mixed cargo and passenger liners. Naturally the $2\frac{1}{2}$ million tons of tankers were interested in the one product which was available for their vessels—oil.

Here he might mention that two tramp owners had been invited to come and take part in the present discussion. One of them, Mr. Watts, was prevented by sickness, but was making a contribution in writing. The other, Mr. Howard Glover, had given his age—79—as an excuse for not being present. Both intimated their disagreement with the use of figures confined to value of cargo or net tonnage of ships.

To come back to the main point, while calculations such as those appearing in the paper were of great value, they should, like the standard death-rate, be qualified by taking into consideration relevant factors. In presenting the carrying-trade for British shipping, or of shipping as a whole, certain other factors were wanted in order to complete the picture, and they should refuse to give their masters the single figure they asked for without some such qualifications. It was obvious that coal, grain, timber, ore and so on should be dealt with separately, and the British tramp ships carrying these should be compared with all tramp shipping, British and foreign. The ships as well as the cargoes should be analysed.

Towards the end of the paper Mr. Leak compared his estimate of the carrying done by British ships, for 1931 and 1936 roughly 40 per cent. of the total, with the British share of world shipping, $31\frac{1}{4}$ per cent., and on these figures he formed a somewhat optimistic conclusion. But the comparison was not quite a correct one. The

figure he gave of world shipping, steam and motor, of 59·1 million tons in 1936, taking vessels of 1,000 tons gross and over, included 9·2 million gross tons of seagoing United States shipping and 2·4 million gross tons of United States lake shipping. If American shipping engaged in the coastal trade and in the lake trade were omitted, and they concentrated on the shipping which might more properly be considered as engaged in international carrying, taking vessels of 2,000 tons gross and over, it would be found that British shipping represented 36·7 per cent. of the total instead of 31½ per cent. in 1936, and there was very little margin between that percentage and the 39·5 per cent. given as the estimate of the British share of sea-borne trade.

He desired to refer only to one other point. The estimate that something like 48 per cent. of the carrying by sea in 1912-13 was done by British ships compared with 40 per cent. in 1936 should have been accompanied by some estimate of the changes in the quantum to which those two percentages applied. The best approximation he could reach was that if the 48 per cent. in 1912 applied to 100 units of carrying, the 40 per cent. in 1936 applied to about 120 units, so that British shipping was at most doing just about as much carrying as it did before the war, while the carrying done by foreign ships had increased from 52 units in 1912 to 72 units in 1936. By doubling their tonnage engaged in the foreign trade, foreign countries had succeeded in securing the whole of the increase in the world's sea-borne trade during the period 1912-36. Therefore the conclusion was not as optimistic as the view expressed in the paper.

[*Added 3 March, 1939.*]

An examination of the available material suggested that the sea-borne proportion of total world trade had increased from about 75 per cent. in 1913 to 78 per cent. in 1931 and 81 per cent. in 1936. He would be glad if the author could say what conclusions on this point could be drawn from his own data.

SIR NORMAN HILL said that this admirable paper went right down to one of the most pressing questions of the day—namely, the share of the British mercantile marine in the carrying-trade of the world. It formed a valuable addition to knowledge, enabling those who read it better to understand the nature of the question and the possibility of answering it. To his mind, ability to secure employment was the only basis upon which merchant shipping could exist as such, and he thought it had been demonstrated that the only employment which, taking the long view, would enable merchant shipping to exist was that provided in the ordinary trade of the world. If merchant ships were built and run in the ordinary course of world trade, but in excess of its requirements, as, for example, to provide a nation with sufficient to meet all its possible needs in time of war, or to enable its traders to secure from transport services provided at an uneconomic cost advantages over the traders of other nations in times of peace, the maintenance of merchant shipping in world trade would become difficult, and in some cases even impossible. Excess of tonnage was not only a heavy and continuing

burden on the exchequers of the nations by which it was provided, but, in so far as it rendered impossible economic competition by vessels under other flags, it operated to deprive both its own traders and all other traders of the benefits of an open freight-market served by ships under all flags, and therefore hampered and restricted its own trade.

It had been pointed out that world trade was subject to wide fluctuations, both in its total volume and in the directions in which it moved. For many years prior to the war the harvests of the world controlled in great measure such variations. Since the war politics had exercised an ever-increasing influence over the movements of trade. It was therefore not an easy matter to estimate, still less to foretell, what the total volume of world trade would be and the class of shipping that would be needed for its transport, but the statistics of the Economic Section of the League of Nations had added greatly to the general knowledge on that point.

Mr. Leak had referred to various methods by which the share of British shipping in the carrying-trade of the world, whatever might be its value, could be estimated year by year. Shortly, the speaker thought these methods could be summarized as follows: First, on the basis of international statistics which related the entrances and clearances of vessels with cargo to the values of all imports and exports, which was the method practised to-day and followed in this country for years. Secondly, on the basis of the weight of goods carried by ships of different nationalities. The Board of Trade had now started such records, making ours the first country to do so. As far as the United Kingdom was concerned, attempts had been made, certainly since 1914, to calculate year by year the weights of the cargoes carried, so that the volume of the cargoes, like their value, could be tested by the statistics. He quite realized that in many ways those estimates of weight were crude, but they had been continued year after year, and they were placed at the disposal of the Ministry of Shipping during the war, and he thought proved to be of substantial use then. The third way was by the gross earnings of the ships of different nationalities. He agreed with Mr. Leak and Dr. Isserlis that if they could get such figures, it would be the best way of answering the question; unfortunately they could not.

Fourthly, the total tonnage of the vessels under the flags of each nationality. That, to his mind, was a thoroughly bad and misleading basis. If the figures appearing in Mr. Leak's paper were taken—he did not stand alone in bringing them forward—it would be found that he included vessels (steam and motor) of over 100 tons gross. These were absolutely worthless figures in calculating the share that British shipping engaged in international trade had in carrying such trade. He believed those figures came from Lloyds' Register of the total number of ships of 100 tons gross and over. The use of such figures caused, in the war, an enormous waste of carrying power. If all ships of 100 tons gross and over are taken into account, there were upwards of 9,000 of such vessels owned in the United Kingdom in 1914. When war came the use of such figures led to the belief that we had an almost inexhaustible number of

vessels at our disposal, and that there was therefore no reason why any of them—ocean-going or otherwise—readily available should not be used by the Army or Navy as store-ships, or even as landing-piers or for officers' clubs. It was a disastrous figure to use, and the use of it has accounted for some of the very gloomy views to which Sir Alfred Flux has just referred. To calculate what share of world trade is carried under different flags, it is well not to bring into account any ship under 2,000 tons gross. Of such vessels the United Kingdom owned 3,700 in 1914 and 2,500 in 1938.

The new departure of the Board of Trade, relating only to the years 1936 and 1937, was very valuable, but it would be as well not to depend too much on it or on the comparisons of 1936 and 1937 with 1931. Mr. Leak, he thought, was mistaken when he said that this problem as to the share of British shipping in the carrying-trade of the world was first dealt with in the Departmental Committee under the Chairmanship of Sir Alfred Booth which sat just after the war. It had been studied for many years before that date, and certain statistical tables published by the Board of Trade, prepared in 1902-3, gave the information that was then available as to the volume of trade carried and the share of British ships in its carrying. There was a committee of the shipping industry which sat during the war, before Sir Alfred Booth's committee sat, and that committee compared the figures for 1912 and 1904. He knew that the figures were not complete. Mr. Leak had brought forward more complete figures for 1936 and 1937, but he thought that before this big question was answered as to what was the British share in the carrying-trade, they should go back and refer to the experience of those earlier years, in which there was certainly something more like normal trade than had been experienced since the war. If Herr Hitler was right, and Germany must die if it could not export, and Lord Halifax was right that equally Great Britain must die if it could not export, politicians must get together and give the shipping trade more to carry. This country had got the ships that could carry it. It had as fine a mercantile marine to-day as it ever had, taking into account speed, carrying capacity, and efficiency. If the shipping industry of this country was given employment, it could give a good account of itself in the markets of the world.

SIR WILLIAM ELDERTON wished to associate himself with the remarks made by Sir Norman Hill and Dr. Isserlis. He thought that when one was measuring the capacity of British shipping and the proportion of work done by such shipping in comparison with the rest of the world, there were many ways in which the comparison might be made. He had never felt happy that the mere money method was entirely satisfactory. If it could be done by measurement of freight, it would certainly be better. But the difficulty, at any rate at the present time, seemed to be that statistics were not fully available. There were certainly circumstances, of course, in which the measurement of the value in money might become absurd, and in which comparisons between successive years might also be vitiated. If the buying capacity of money were to

change considerably, that would be one of the cases in which non-sensical results would be obtained.

Another circumstance would be similar to that which arose during the war, and might arise again, when the weight of goods, allowing for the effect of space as well, became far more important than mere value. Carrying capacity in that sense might again become the governing factor in shipping work. A severe diminution in shipping resulting from the sort of practice that Sir Norman Hill had just been mentioning as having been in the minds of the Admiralty on one or two occasions during the war might take place. Further, the weight of goods carried, though not directly tabulated, had, in fact, been tabulated approximately in this country for a number of years, and those figures were, so far as the United Kingdom was concerned, sufficiently accurate for all practical purposes. He was inclined to think that there were some other countries where the figures might possibly be obtained, and if they could be obtained universally, they would be most valuable.

Mr. Leak made a remark, with which he agreed, that statistics of arrivals and departures were not comparable with those of entrances and clearances, owing to the duplication which occurred in the former as a result of vessels discharging or loading cargoes at more than one port. Again, in the changed circumstances which might be brought about by war, one might get much nearer to comparability between those two items than in normal times of peace. For example, if a country had to convoy its shipping, or if there was a considerable risk of submarine or air activity, it would probably be inadvisable to call at more ports than was absolutely necessary.

He supposed that to themselves as statisticians figures were always amusing, and perhaps in one way shipping figures were specially amusing. At any rate they sometimes indicated changes in popular habits, and even in the present paper one could find such changes indicated, for example, by the tremendous relative increase in the amount of tank tonnage.

The only reason he had intervened in this discussion was to say a word of gratitude to Mr. Leak for a paper which he felt was very interesting.

MAJOR BUSTARD sympathized with Mr. Leak in his endeavour to bring about a relationship of statistics and shipping in spite of the paucity of material. As explained in the paper, the figures were confined to tonnage cargo to the exclusion of passenger statistics. Dealing first with the question of cargo, it was very difficult to establish what might be regarded as a yard-stick for measuring the value of the carriage of cargoes, in that it had not yet been possible to establish a common factor. Reference had been made to the value of merchandise. That was a very important figure from the point of view of the importers and exporters of the country, but not necessarily of such importance as representing the value to the shipping industry. He had been studying statistics of the value of merchandise between this country and the United States over a period of five or six years. These figures showed a steady increase

in the values of imports and exports up to last year. That did not necessarily mean that there was an increase of value to the shipping industry, because the increase in the value of the merchandise reflected very largely the increase in commodity prices, and, as they knew, freights were not established on the value of the merchandise. Freights might in time work up or down in relation to it, but they were not reflected immediately, possibly not for two or three years.

Taking again the question of tonnage, there was frequently a confusion of thought between weight and measurement. It often rested with the shipowner whether freight would be assessed on the one basis or the other, and unless it was clearly determined whether it was weight or measurement, and whether one took 40 or, say, 70 cubic feet to the ton, tonnage did not give a true picture of value to the shipping industry.

There was also a point with respect to bullion and specie. These were among the few commodities for which freight was reckoned according to the value of the commodity, but they would convey very little in the matter of tonnage statistics. The conclusion he had come to was that if they wished to record the carriage of cargo in relation to its value to the shipping industry, there was only one reliable test to be taken, and that was the value as represented by the freight earned by the industry. Those figures were practically unobtainable, but had not the time come when the shipping industry should realize the value of matters such as these being reviewed by bodies like the Royal Statistical Society, and should appreciate that the public could only be expected to support the representations of the industry for public assistance if it clearly understood the nature of the problem?

In conclusion, there was the question of the passenger trade. Mr. Leak had had to dismiss that from his conclusions because statistics were not available. It was, he felt, grossly misleading to deal with any conclusions affecting the carrying-trade of British shipping unless the passenger trade were taken into the calculations. The Board of Trade had in their possession the statistics of the passenger trade in and out of this country, and it should surely be possible to them to produce the material which would give one an intelligible idea of what the passenger-carrying trade meant to the shipping industry. One would also hope that after the British figures had been brought on to a basis which could be assimilated, it would be possible, through the statistical department of the League of Nations, to obtain figures for other countries.

(The following written comment was received from Mr. E. H. Watts.)

Dr. Isserlis has committed me to writing a comment on Mr. Leak's paper, because, as he told the Meeting on the 21st February, I was unable, through illness, to present a criticism on that occasion. Perhaps this was fortunate, as Mr. Leak's outlook on the shipping industry is fundamentally different from my own. It is one thing to make a living by the successful operation of British ships, or, if unsuccessful, to pay for it; it is quite another to produce mathematical formulæ in an atmosphere of scholastic seclusion. To ask

a practical shipowner to criticize a statistician's figures—which to the uninitiated and unsophisticated seem to indicate that statistically the industry does not know its business, and far from showing losses should have made good profits—is asking for trouble.

I do not propose to criticize Mr. Leak's paper, except to say that his figures and conclusions are so much at variance with the facts and knowledge of those intimately concerned in the business that it is high time there was an investigation into the Board of Trade's method of producing shipping statistics. Their statisticians are responsible for years of misinformation about the shipping industry, and must shoulder their full share of the responsibility for the *laissez-faire* attitude which has brought that industry to its knees, and horrified the country with the spectre of starvation in time of war.

MR. H. LEAK said that he wanted only to say a word of grateful thanks to the speakers for the remarks they had contributed. He was specially glad that his old friend, Sir Norman Hill, Chairman of the Merchant Shipping Advisory Committee for so many years, had been able to be present, also his former chief, Sir Alfred Flux.

He would reserve his comments on most of the points raised, but he would like to reply at once to a remark made by Dr. Isserlis. Dr. Isserlis had suggested that he ought to have excluded most of the United States shipping, because it was engaged partly on the lakes, and partly in the coasting trade. So far as it was engaged on the lakes there was a great deal of British shipping also engaged on the lakes, and he was taking that into account, quite correctly, because it was international trade. Again, so far as it was in the coasting trade of the United States, there was a great deal of British shipping engaged in the coasting trade: and vessels of large size were employed, for example, between India and Burma, which was coasting trade from the point of view of this paper, and was very important. If the one were excluded the other must be excluded also; one could not count it out on one side and not on the other. As he was not able to count it out on both sides, therefore he included it on both. There was something to be said in favour of the higher tonnage limit of 2,000 tons, but tonnage over 100 tons gross was the only figure he could get relating to the pre-war period. The proportion for these larger vessels in 1936 was 31.7 per cent., which did not differ greatly from the 31½ per cent. mentioned in the paper.

(The following portion of Mr. Leak's reply was received in writing.)

Dr. Isserlis made some remarks about the quantum of trade carried in British and foreign ships, and implied that when looked at from that point of view the conclusion should be less optimistic. I should prefer to regard my conclusion as not pessimistic rather than optimistic, while Dr. Isserlis tends to look on the dark side. On the basis of his own figures, British ships carried as much per ton in 1936 as in 1912, but foreign ships carried about 30 per cent. less. When the quantum of world trade rose by about 14 per cent. as it did in 1937, British ships would have carried more cargo per ton than they did before the war, while foreign vessels had more lee-way to make up. This comparison serves to confirm the inference drawn

in the paper that British vessels were so fully employed in 1937 as to result in an appreciable influx of foreign vessels into the carrying-trade from British countries to the United Kingdom in that year.

The sea-borne proportion of world trade rose from 75 per cent. in 1912 to 79 per cent. in 1931 and 84 per cent. in 1936. The very marked rise between 1931 and 1936 may be attributed primarily to differential price changes. In 1931 prices of industrial raw materials and primary foodstuffs were relatively very low, and a more normal relationship between these prices and the prices of more finished goods had been established in 1936. As it is these primary products which are mainly carried by sea, a much lower sea-borne proportion of world trade in 1931 than in 1936 was to be expected, but relative price changes do not serve to explain to any appreciable extent why the proportion of the trade between foreign countries in Europe which was carried by sea was greater in 1936 than in 1931, as this trade is not mainly in primary products. A very detailed analysis would be necessary to enable a convincing reason to be given for this latter change. As regards the rise in the proportion in 1936 compared with 1921, the creation of new international boundaries after the war added to the total of world trade, but the balance as between sea and land trade is believed not to have been seriously disturbed by this factor, the inter-trade between Great Britain and the Irish Free State serving to balance the increase in trade over new land boundaries in Europe. The reason for the relative increase in sea-borne trade after the war is, I think, to be found in the increasing efforts of nations to become self-sufficient. They cannot produce within their boundaries all the primary products they need, but they now import less of the more finished goods from other countries. Perhaps this may account for the recent increase in the sea-borne proportion of trade between foreign countries in Europe.

As regards the remarks of Mr. Watts about the inadequacy of the statistics of entrances and clearances as a measure of the work done by British shipping, proposals for other statistics were made some years ago but, as Sir Alfred Flux says, "it did not appear worth while to those engaged in the shipping business to supply the needed additional information." The new statistics relating to the value of goods carried in vessels of different nationalities, which are compiled from information furnished by importers and exporters, show that the misrepresentation of the facts regarding United Kingdom trade, given by the navigation statistics, was in the direction of showing that the British share of the trade was lower and not, as might be gathered from Mr. Watts' remarks, higher than in actual fact. I did not deal in my paper with the profits or losses of shipowners.

As a result of the ballot taken during the meeting the candidates named below were elected Fellows of the Society :—

Alfred Walter Bayes.
Douglas Stewart Blacklock.
John Bernard Bourne.
James Edward Frankland, A.I.A.
Eugene Grebenik.
William Henry Higginbotham.

Edward Frederick John Plumridge,
A.I.A.
Gilbert Richardson.
Gilbert Thomas.
Ronald Stanley Walshaw.
Owen Archibald Wright, B.Sc.

WHOLESALE PRICES IN 1938

BY THE EDITOR OF "THE STATIST"

(*The Statist's* Index Numbers in continuation of
Mr. A. Sauerbeck's figures)

THE Sauerbeck-*Statist* index numbers of wholesale prices are set out in the following table. The annual averages are shown for every year since 1846 (that is, from the commencement of the calculations), and Jevons's figures for the years 1810 and 1818, adjusted to Sauerbeck's standard, are also included. These all-commodities index numbers embrace forty-five commodities, and are calculated, with few exceptions, from the average of fifty-two weekly quotations for each commodity, the averages for the standard period 1867-77 being taken as 100. Up to the end of 1912 the compilation of the statistics was made by Mr. Augustus Sauerbeck, and subsequently by *The Statist*.

TABLE I

THE STATIST'S *Annual Index Numbers* (in continuation of
Sauerbeck's figures)
(1867-77 = 100)

Year.	Average No.	Year.	Average No.	Year.	Average No.	Year.	Average No.	Year.	Average No.
1938	91	1919	206	1900	75	1881	85	1862	101
'37	102	'18	192	1899	68	'80	88	'61	98
'36	89	'17	175	'98	64	'79	83	'60	99
'35	84	'16	136	'97	62	'78	87	1859	94
'34	82	'15	108	'96	61	'77	94	'58	91
'33	79	'14	85	'95	62	'76	95	'57	105
'32	80	'13	85	'94	63	'75	96	'56	101
'31	83	'12	85	'93	68	'74	102	'55	101
'30	97	'11	80	'92	68	'73	111	'54	102
'29	115	'10	78	'91	72	'72	109	'53	95
'28	120	1909	74	'90	72	'71	100	'52	78
'27	122	'08	73	1889	72	'70	96	'51	75
'26	126	'07	80	'88	70	1869	98	'50	77
'25	136	'06	77	'87	68	'68	99	1849	74
'24	139	'05	72	'86	69	'67	100	'48	78
'23	129	'04	70	'85	72	'66	102	'47	95
'22	131	'03	69	'84	76	'65	101	'46	89
'21	155	'02	69	'83	82	'64	105	'18	159*
'20	251	'01	70	'82	84	'63	103	'10	171*

* Jevons's numbers adjusted.

For the year 1938 the annual index number is 91, compared with 102 in 1937 and 89 in 1936. Thus the post-1929 peak has been passed and prices have relapsed almost to the level of the year 1936, with little prospect that the downtrend will be reversed, even if it is flattened, at an early date. From the peak of 107.3 reached by the index in March 1937, the decline has been of the order of 17.1 per cent., the number for March last being 89.0.

TABLE II

THE STATIST'S *Annual Index Numbers—ten-year averages*
(1867-77)

1838-1847 = 93	1900-1909 = 73	1915-1924 = 162
'48- '57 = 89	'01- '10 = 73	'16- '25 = 165
'58- '67 = 99	'02- '11 = 74	'17- '26 = 164
'68- '77 = 100	'03- '12 = 76	'18- '27 = 159
'78- '87 = 79	'04- '13 = 77	'19- '28 = 152
'88- '97 = 67	'05- '14 = 79	'20- '29 = 142
'90- '99 = 66	'06- '15 = 82	'21- '30 = 127
'91-1900 = 66	'07- '16 = 88	'22- '31 = 120
'92- '01 = 66	'08- '17 = 98	'23- '32 = 115
'93- '02 = 66	'09- '18 = 110	'24- '33 = 110
'94- '03 = 66	'10- '19 = 123	'25- '34 = 104
'95- '04 = 67	'11- '20 = 146	'26- '35 = 99
'96- '05 = 68	'12- '21 = 148	'27- '36 = 95
'97- '06 = 70	'13- '22 = 153	'28- '37 = 93
'98- '07 = 71	'14- '23 = 157	'29- '38 = 90
'99- '08 = 72		

1938 was by no means a year of uninterrupted decline in commodity prices. As in the case of the previous year, it falls into two phases, which are demarcated in the month of May. Until May of last year the downtrend of prices, which had begun twelve months before, continued at a steady rate, while the top-heavy statistical structure was further reduced to manageable proportions. There is reason to believe that the fall in general business activity, the deflation of speculative positions, and the drop in security prices had been somewhat overdone, particularly in view of the retarding influence of growing government expenditure in armaments in all countries as the result of the succession of political crises that attended the emergence of the greater German Reich. From May, therefore, there set in what may be termed a phase of "pause" in the trade cycle, though in the United States there was an active recovery, which began in June and continued until the winter, while a slower and less uniform recovery in general business conditions elsewhere set in following the temporary September political settlement. This recovery, however, had little obvious effect on the trend of commodity prices and the index stood at 89.1 in December, compared with 91.4 in May, after falling to a "low" of 87.4 in

November. In the first months of the present year, after an initial fall, the index number has been fairly steady.

While consumption of many commodities has increased, largely as the result of the American recovery in the summer, the high level of stocks continues to overshadow future prospects, and for these commodities the production of which is regulated by international restriction schemes, quotas have generally been maintained at a low level. The restraining effect of the international situation upon trade, and in particular the non-appearance of the expected American spring revival, must be expected to induce continued quietude in commodity prices, despite the slight rise which has occurred in March. The effect of an outbreak of hostilities is, of course, not easy to foresee, but a big rise in prices might be expected in certain commodities, so long as private trading had any reality.

The course of commodity prices as reflected by *The Statist* sectional indices was not, however, uniform. The all-commodities index is made up of two groups—food and materials—and each group comprises three sections. The annual group and sectional indices, together with the all-commodities index, are set out in the table on page 272; on page 273 is a table giving the monthly indices since the beginning of 1936, and on the following page quarterly movements are given.

A decrease on balance is shown for all of the sectional indices last year, and also for all of the indices of the component items. The largest decrease was recorded for textiles, followed by sundry materials and vegetable foods; smaller decreases were recorded for animal food, sugar, tea, and coffee and minerals. A better picture of the movement of sectional prices last year, however, is given in the table showing quarterly averages. The decline in foodstuff prices which began in the last quarter of 1937 has been fairly regular, but while that in vegetable foods, under the influence of the wheat glut, has been steep, that in animal foods has been moderate, and that of sugar, coffee and tea occurred almost wholly between the last quarter of 1937 and the first of 1938, since when the component index has fluctuated narrowly. In addition to the decline in wheat prices, the prices of barley and oats have also fallen considerably, but the prices of potatoes and rice have risen further. Among animal foods the exceptions to the general declines were pork, bacon, and butter. While sugar and tea prices were down only slightly, Brazilian coffee shows a big break on the year.

The two divergent trends in the minerals section of the materials group was continued in 1938, the prices of iron and coal being stabilized at the highest levels of 1937, while non-ferrous metals ended lower on the year. The fall in these metals, however, was arrested

in May, and the indices for copper and tin ended somewhat higher at the end of the year than at the beginning, though in the first months of the current year there was a relapse. In the textiles section cotton prices, though lower on average, recovered in the latter part of the year, and have shown a firm tendency since, and though wool fell sharply early in 1938, it has since been very steady. Jute declined in 1938, the spectacular rise taking place in January and February of the current year. The index for silk declined sharply in March, and then remained stable until an improvement set in in December. Among most sundry materials a better tendency was seen in the later months, but the decline in timber was continuous. As the result of these declines in the three sections, the materials group index fell from 110 in 1937 to 96 in 1938, against the slightly less severe fall in the food index from 93 to 84. At the end of this article on page 279 the average prices and index numbers for all the commodities comprised in *The Statist* index number are given for the period since 1918; the figures for 1873 are also shown and average prices for four ten-year periods.

Monthly Fluctuations of the Index Numbers* of 45 Commodities, 1867-77 = 100

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1888	70.9	70.6	69.9	69.8	68.1	67.4	69.0	70.1	71.9	72.4	72.7	73.2	70
1895	60.0	60.0	60.8	61.7	62.5	62.4	62.8	63.3	63.5	63.3	62.3	61.2	62
'96	61.4	61.4	60.7	60.3	60.1	59.3	59.2	59.7	61.2	62.6	62.6	62.0	61
'97	62.0	61.9	61.9	61.5	61.2	61.3	61.7	63.2	63.4	62.7	62.4	62.4	62
'98	62.8	63.4	63.0	65.5	66.4	64.7	64.3	64.0	63.9	63.6	63.9	63.8	64
1899	65.4	65.8	65.6	66.1	66.6	66.9	67.9	68.3	70.0	71.5	71.6	72.3	68
1900	74.0	75.1	75.7	75.6	75.5	75.7	76.2	76.0	75.5	74.7	73.9	73.4	75
'01	72.2	71.7	71.0	70.6	70.5	69.8	69.5	69.8	69.6	69.6	69.0	68.4	70
'02	68.8	68.9	69.2	69.7	70.9	70.4	70.0	69.5	69.3	68.8	68.6	69.1	69
'03	69.5	70.2	70.4	69.4	69.6	69.5	69.5	70.0	69.1	69.0	69.0	70.0	69
1904	70.4	70.8	70.8	70.5	69.9	69.4	69.9	70.4	70.7	71.0	71.2	70.9	70
'05	71.2	71.4	71.8	72.0	71.7	72.0	72.5	72.3	72.4	73.2	74.2	74.9	72
'06	75.2	75.0	75.7	76.5	77.0	76.9	76.4	76.7	77.5	78.5	78.6	79.7	77
'07	80.0	80.7	80.0	80.7	82.4	82.0	81.1	79.4	79.1	78.8	76.7	76.2	80
'08	76.0	74.5	74.1	73.8	73.6	72.9	73.1	72.2	72.5	72.2	72.2	72.3	73
1909	72.0	71.9	72.4	74.3	75.4	75.1	75.2	74.9	74.7	75.2	75.5	76.3	74
'10	77.1	78.1	79.1	78.5	78.2	76.9	78.1	78.2	77.6	77.2	77.8	77.9	78
'11	78.5	78.6	78.9	80.0	80.3	80.0	78.9	79.5	80.3	80.7	80.6	80.9	80
'12	81.8	82.9	84.4	85.0	85.3	85.5	86.5	85.9	86.7	85.8	85.3	86.4	85
'13	86.4	86.1	86.7	86.2	85.7	84.1	84.2	85.0	85.7	84.5	83.3	83.8	85
1914	83.5	83.8	82.8	82.3	82.3	81.2	82.4	87.9	89.3	89.8	88.8	91.6	85
'15	96.4	100.9	103.7	105.9	107.2	106.4	106.4	107.0	107.8	110.0	113.1	118.4	108
'16	123.6	127.0	130.4	134.2	135.4	131.0	130.5	134.5	134.4	141.5	150.8	154.3	136
'17	159.3	164.0	169.0	173.0	175.0	180.4	176.9	175.7	176.4	180.6	182.9	185.1	175
'18	186.2	187.3	188.0	189.8	191.1	192.3	192.9	195.9	197.1	197.8	195.3	196.0	192
1919	192.1	187.5	184.7	184.6	194.6	199.4	206.4	212.7	214.8	224.3	231.0	235.2	206
'20	245.3	260.4	261.8	266.1	260.0	255.7	254.6	253.5	248.7	239.9	223.8	207.2	251
'21	197.2	183.0	177.2	169.8	162.2	155.8	158.2	154.3	149.4	138.4	136.7	133.6	155
'22	132.5	132.2	133.3	134.8	135.5	135.6	134.0	129.6	127.9	130.1	130.6	129.1	131
'23	130.2	131.9	132.7	134.0	132.2	127.9	124.8	125.0	127.8	127.7	132.4	133.2	129
1924	137.2	138.8	137.0	136.8	136.4	136.3	138.4	138.0	141.3	146.1	145.5	147.7	139
'25	144.8	143.1	140.1	137.5	135.7	131.2	134.3	134.3	132.7	130.2	132.9	130.4	136
'26	129.3	127.9	126.1	125.5	125.7	124.9	126.0	127.0	128.0	131.0	130.8	123.9	126
'27	123.1	124.1	123.6	123.3	123.8	123.1	122.0	122.8	121.5	120.6	121.5	121.4	122
'28	120.9	121.1	123.6	125.6	126.2	122.6	120.3	118.0	116.8	116.8	117.9	117.9	120
1929	117.0	120.1	120.5	116.5	113.0	113.1	115.2	113.9	112.6	111.1	108.3	108.8	115
'30	106.6	104.8	103.0	101.5	98.8	95.8	94.4	92.2	90.8	90.4	88.6	86.9	97
'31	85.7	85.5	85.5	84.4	82.2	82.6	80.2	79.1	80.7	82.3	83.0	85.4	83
'32	84.7	86.7	84.1	82.5	80.2	77.0	78.9	80.7	80.4	77.8	77.9	77.7	80
'33	77.8	77.0	77.0	78.5	80.9	81.3	81.7	81.2	80.7	80.5	79.3	80.0	79
1934	82.5	82.5	82.2	81.0	81.1	80.7	82.4	83.4	82.1	81.1	81.0	82.8	82
'35	83.6	83.4	82.9	84.1	85.2	83.7	84.3	84.1	85.1	85.8	86.3	86.7	84
'36	87.1	87.1	86.7	86.2	85.6	84.8	87.1	89.0	90.4	91.7	94.5	98.9	89
'37	99.6	102.1	107.3	104.7	106.2	104.7	105.9	104.4	103.3	100.8	96.7	97.3	102
'38	96.5	96.4	94.2	93.5	91.4	91.4	91.1	88.6	88.6	88.8	87.4	89.1	91
'39	88.7	88.6	89.0										

* The average of the twelve monthly figures of each year does not necessarily coincide with the annual figures, as the latter are calculated mostly from the average of 52 weekly quotations, while the former are based on end-of-the-month prices.

Summary of Index Numbers. Groups of Articles, 1867-77 = 100

	Vegetable Food (Corn, etc.)	Animal Food (Meat, etc.)	Sugar, Coffee, and Tea	Total Food	Minerals	Textiles	Sundry Materials	Total Materials	Grand Total	Silver *	Wheat Harvest †	Average Price of Consols ‡	Average Bank of England Rate ‡
1873.....	106	109	106	107	141	103	106	114	111	97·4	80	92½	4·750
1896.....	53	73	59	62	63	54	63	60	61	50·5	112	110½	2·483
1911.....	70	90	61	75	93	76	81	83	80	40·4	110	79½	3·467
1913.....	69	99	54	77	111	84	83	91	85	45·3	105	73½	4·771
'14.....	75	100	58	81	99	81	87	88	85	41·6	109	72½	4·038
'15.....	108	126	70	170	126	92	109	108	108	38·9	106	65½	5·000
'16.....	133	152	86	130	158	129	136	140	136	50·4	97	58½	5·470
1917.....	177	192	113	169	172	192	174	179	175	65·8	102	54½	5·15
'18.....	168	207	130	174	192	222	202	206	192	76·4	111	56½	5·0
'19.....	179	213	147	185	220	228	219	222	206	85·3	98	54½	5·166
'20.....	227	263	198	234	295	262	244	264	251	76·1	96	47½	6·71
'21.....	143	218	83	158	181	140	145	153	155	48·1	118	47½	6·092
1922.....	107	184	82	130	142	134	124	132	131	51·6	105	56½	3·692
'23.....	98	162	101	122	155	140	117	134	129	49·4	105	57½	3·496
'24.....	119	158	105	130	158	170	120	146	139	50·7	107	56½	4·0
'25.....	118	162	89	128	154	165	119	143	136	52·5	114	56½	4·575
'26.....	108	150	88	119	154	133	114	131	126	47·1	99	54½	5·0
1927.....	108	138	83	114	141	131	118	129	122	42·8	109	54½	4·650
'28.....	107	142	78	114	123	136	117	124	120	44·0	109	55½	4·5
'29.....	99	146	72	110	126	122	111	119	115	40·2	114	54½	5·508
'30.....	77	142	54	96	112	84	97	97	97	29·0	99	56	3·4
'31.....	68	119	50	83	100	63	85	82	83	20·4	99	55½	3·975
1932.....	72	105	50	79	99	64	81	81	80	19·5	105	66½	3·017
'33.....	60	106	47	74	107	67	80	83	79	18·7	114	73½	2·0
'34.....	63	108	50	77	109	72	80	85	82	20·0	120	80½	2·0
'35.....	66	107	42	76	112	80	83	90	84	26·4	112	86½	2·0
'36.....	75	109	41	81	118	83	88½	94	89	18·5	100	85½	2·0
'37.....	93	117	49	93	142	93	101	110	102	18·4	99	76½	2·0
'38.....	81	111	43	84	136	75	87	96	91	17·6	122	74½	2·0
Average													
1904-13	68	91	53	73	95	74	76	81	77	44·1	106	82½	3·733
1890-99	61	80	63	68	71	56	66	64	66	55·8	103	103½	2·958
'78-87	79	95	76	84	73	71	81	76	79	82·1	97	99½	3·264
1818-27	109	90	151	111	128	105	106	112	111	98·0	—	—	3·692

* Silver (see note on p. 276), parity of 1 gold to 15½ silver = 100.

† Wheat harvest in U.K. to 1895: 29 bushels = 100; from 1896: 30 bushels = 100.

‡ Average price of Consols and the average Bank of England rate of discount are actual figures, not index-numbers; Consols 3% to 1888, 2½% from 1889, 2½% from April, 1903.

THE STATIST'S *Index Numbers—monthly averages by groups*
(1867-77 = 100)

		Vegetable Food	Animal Food	Sugar, Tea, and Coffee	Food-stuffs	Minerals	Textiles	Sundry Materials	Total Materials	All Commodities
1936										
Jan.	...	73.4	104.8	41.9	78.4	114.9	84.9	86.2	93.5	87.1
Feb.	...	71.9	104.9	41.0	77.6	116.9	84.1	86.7	94.0	87.1
March	...	71.0	104.1	40.8	76.8	116.6	84.7	86.3	94.0	86.7
April	...	73.4	102.3	40.9	77.2	116.7	81.4	85.9	92.8	86.2
May	...	71.2	108.7	39.6	78.3	114.7	79.1	84.2	90.8	85.6
June	...	69.1	110.4	38.5	77.9	112.7	77.7	84.2	90.0	84.8
July	...	69.3	114.0	38.9	79.4	114.5	80.7	87.5	92.7	87.1
Aug.	...	76.4	112.1	39.1	81.7	115.6	79.6	91.7	94.4	89.0
Sept.	...	80.3	111.8	39.4	83.3	119.9	81.1	90.8	95.6	90.4
Oct.	...	83.9	111.2	40.8	84.9	122.8	84.7	88.8	96.7	91.7
Nov.	...	84.0	110.5	41.9	84.9	129.9	87.6	93.6	101.5	94.5
Dec.	...	89.6	110.5	45.0	87.9	136.2	92.4	99.1	107.0	98.9
1937										
Jan.	...	91.3	108.1	46.2	88.0	134.5	95.9	100.3	108.1	99.6
Feb.	...	91.1	111.5	46.7	89.3	144.8	96.1	101.6	111.5	102.1
March	...	97.0	118.4	48.3	94.6	153.5	100.2	104.9	116.5	107.3
April	...	96.3	120.1	48.5	95.0	138.5	100.0	103.7	111.8	104.7
May	...	95.6	121.8	50.2	95.7	146.1	100.9	102.7	113.8	106.2
June	...	90.9	121.2	50.2	93.5	145.9	98.9	102.2	112.9	104.7
July	...	92.9	123.3	50.5	95.2	149.4	97.6	102.7	113.7	105.9
Aug.	...	92.4	121.7	49.5	94.2	148.0	95.1	100.9	111.8	104.4
Sept.	...	94.5	119.2	50.5	94.3	145.8	91.0	100.7	109.9	103.3
Oct.	...	96.4	117.6	49.0	94.2	138.6	85.4	99.3	105.6	100.8
Nov.	...	94.4	114.0	47.1	91.7	135.5	78.7	93.7	100.3	96.7
Dec.	...	95.7	117.2	45.6	93.1	134.7	79.5	93.8	100.4	97.3
1938										
Jan.	...	95.0	115.2	44.2	91.7	135.0	79.4	92.8	100.0	96.5
Feb.	...	92.0	117.1	42.7	90.9	136.2	78.6	93.7	100.5	96.4
Mar.	...	89.9	116.9	42.3	89.8	133.3	75.5	90.6	97.4	94.2
April	...	89.1	116.9	42.4	89.5	132.3	75.3	89.1	96.5	93.5
May	...	89.1	114.3	42.3	88.5	129.6	72.3	85.9	93.5	91.4
June	...	89.5	111.1	42.0	87.5	134.2	72.8	84.6	94.3	91.4
July	...	83.5	109.6	42.0	84.4	136.0	75.1	85.7	96.0	91.1
Aug.	...	76.2	106.9	42.9	80.5	134.6	73.3	84.6	94.5	88.6
Sept.	...	74.3	105.7	43.7	79.4	137.1	73.4	84.8	95.4	88.6
Oct.	...	70.7	104.1	43.0	77.2	141.1	74.4	85.9	97.2	88.8
Nov.	...	67.0	103.6	43.0	75.4	140.6	73.1	84.6	96.1	87.4
Dec.	...	68.7	109.6	44.0	78.6	140.0	75.4	84.8	96.8	89.1
1939										
Jan.	...	68.9	110.9	43.3	79.0	134.8	78.0	84.0	95.9	88.7
Feb.	...	67.7	110.0	43.1	78.2	133.8	80.1	83.9	96.2	88.6
Mar.	...	67.3	111.7	44.1	78.8	133.9	80.7	84.2	96.5	89.0

Quarterly Movements of Prices *

Summary of Index Numbers, 1867-77 = 100

Years	Quar- ters	Vege- table Food (Corn, etc.)	Animal Food (Meat, etc.)	Sugar, Coffee, and Tea	Total Food	Min- erals	Tex- tiles	Sun- dry Mate- rials	Total Mate- rials	Grand Total	Sil- ver †
1927	I	108.1	143.4	85.4	116.1	155.0	120.7	118.3	128.9	123.6	43.0
	II	111.6	145.9	82.6	118.1	140.7	127.9	118.2	127.2	123.4	43.0
	III	106.9	138.1	80.8	112.9	133.3	130.8	118.1	128.8	122.1	42.1
	IV	104.5	132.1	82.0	110.0	132.8	138.6	120.6	129.5	121.2	43.3
'28	I	108.9	143.8	80.3	115.7	123.6	136.7	120.6	126.3	121.9	43.2
	II	118.0	152.0	81.1	122.8	122.9	140.6	117.9	126.3	124.8	44.7
	III	101.1	142.0	77.9	111.2	121.0	135.3	116.7	123.6	118.4	44.3
	IV	101.9	138.1	76.3	109.8	126.0	131.5	115.3	123.5	117.5	43.7
'29	I	102.9	142.7	75.4	111.8	130.2	130.7	116.6	124.6	119.2	42.8
	II	92.8	148.3	73.2	109.1	125.0	121.2	111.1	117.9	114.2	41.1
	III	99.9	143.4	71.7	110.0	126.9	115.6	111.1	116.7	113.9	39.6
	IV	91.3	145.2	64.2	105.4	122.9	107.9	108.7	112.3	109.4	37.3
'30	I	80.8	152.1	58.3	102.3	121.1	96.4	104.9	106.7	104.8	33.0
	II	76.7	142.4	56.5	96.5	96.5	92.4	99.5	100.4	98.7	29.8
	III	77.4	132.1	48.6	91.5	109.0	77.3	94.6	94.6	92.5	26.8
	IV	71.9	130.0	51.7	89.0	105.4	68.9	91.6	88.3	88.6	26.5
'31	I	69.0	127.3	48.6	86.2	103.4	62.7	89.8	85.1	85.6	21.8
	II	69.5	123.3	48.8	85.0	98.6	61.4	85.6	81.7	80.1	21.3
	III	70.0	117.4	47.0	81.4	98.5	58.6	81.6	79.0	83.0	21.9
	IV	75.7	107.9	53.7	82.9	102.2	66.9	85.4	84.1	83.6	21.5
'32	I	80.7	109.2	52.2	83.2	101.1	67.5	87.8	85.2	85.2	21.0
	II	77.6	107.6	50.2	82.9	95.1	59.4	79.6	77.3	79.9	19.4
	III	68.2	105.3	49.6	77.9	100.6	65.9	80.7	81.5	80.0	19.4
	IV	64.2	98.2	48.4	73.4	101.2	64.5	80.2	81.0	77.8	18.4
'33	I	60.2	106.0	47.3	74.4	99.7	62.0	79.1	79.4	77.3	18.2
	II	59.1	108.4	47.4	74.8	109.7	68.7	79.8	84.2	80.2	20.0
	III	62.0	105.8	47.9	75.2	111.0	71.0	80.0	85.6	81.2	18.5
	IV	58.5	106.4	47.4	73.8	110.9	67.7	79.7	84.4	79.9	18.5
'34	I	59.4	110.1	53.0	76.7	111.7	73.6	79.9	86.5	82.4	19.1
	II	58.7	110.3	52.2	76.1	108.4	70.8	79.1	84.4	80.9	18.6
	III	71.0	109.5	48.0	80.4	108.5	70.7	78.7	84.3	82.6	19.7
	IV	66.7	107.3	44.8	77.0	109.7	70.9	79.6	85.0	81.6	22.1
'35	I	64.4	111.2	41.3	76.8	108.9	77.4	82.6	88.0	83.3	23.0
	II	67.1	107.9	42.3	76.9	112.3	79.4	82.8	89.8	84.3	29.3
	III	68.8	106.6	40.6	76.8	113.8	80.1	82.3	90.1	84.5	27.3
	IV	70.7	104.1	41.8	76.9	116.7	83.6	84.9	93.0	86.3	25.7
'36	I	72.1	104.6	41.2	77.6	116.1	84.6	86.4	93.8	87.0	18.2
	II	71.2	107.1	39.7	77.8	114.7	79.4	84.8	91.2	85.5	18.6
	III	75.3	112.6	39.1	81.5	116.7	80.5	90.0	94.2	88.8	18.6
	IV	85.8	110.7	42.6	85.9	129.6	88.2	93.8	101.7	95.0	18.9
'37	I	93.1	112.7	47.1	90.6	144.3	97.4	102.3	112.0	103.0	18.6
	II	94.3	121.0	49.6	94.7	143.5	99.9	102.9	112.8	105.2	18.7
	III	93.3	121.4	50.2	94.6	147.7	94.6	101.4	111.8	104.5	18.4
	IV	95.5	116.3	47.2	93.0	136.3	81.2	95.6	102.1	98.3	18.0
'38	I	92.3	116.4	43.1	90.8	134.8	77.8	92.4	99.3	95.7	18.5
	II	89.2	114.1	42.2	88.5	132.0	73.5	86.5	94.8	92.1	17.4
	III	78.0	107.4	42.9	81.4	135.9	73.9	85.0	95.3	89.4	17.3
	IV	68.8	105.8	43.3	77.1	140.6	74.3	85.1	96.7	88.4	17.4

* The averages of the four quarterly figures to each year do not necessarily coincide with the annual averages, as the latter are based as far as possible on average weekly prices. See also the *Journal*, 1893, p. 221; 1895, p. 144; 1901, p. 90; and 1909, p. 70.

† Silver, parity of 1 gold to 15½ silver = 100.

Construction of the Tabular Statements

The following table illustrates the method of construction of the index numbers. The index numbers here given are based on the average prices for the eleven years 1867-77. Take, for instance, the *Gazette* price of English wheat :—

		<i>s.</i>	<i>d.</i>	
Average, 1867-77	...	54	6	= 100, average point.
.. 1914	...	35	0	= 64, or 36 per cent. <i>below</i> the average point.
.. 1930	...	80	7	= 148, .. 48 .. <i>above</i>
.. 1926	...	53	3	= 98, .. 2 .. <i>below</i>

The individual index numbers, therefore, represent simple percentages of the average point.

The articles are grouped in six categories :—

		1867-77 Total Numbers	Example for 1938	
			Total Numbers	Average
1. Vegetable food, corn, etc. (wheat flour, barley, oats, maize, potatoes, and rice) ...	8 Index nos.	800	651	81
2. Animal food (beef, mutton, pork, bacon, and butter) ...	7 ..	700	777	111
3. Sugar, coffee, and tea ...	4 ..	400	172	43
1—3. <i>Food</i> ...	19 ..	1,900	1,600	84
4. Minerals (iron, copper, tin, lead, and coal) ...	7 ..	700	949	136
5. Textiles (cotton, flax, hemp, jute, wool, and silk) ...	8 ..	800	601	75
6. Sundry materials (hides, leather, tallow, oils, soda, nitrate, in- digo, and timber) ...	11 ..	1,100	954	87
4—6. <i>Materials</i> ...	26 ..	2,600	2,504	96
<i>General Average</i> ...	45 ..	4,500	4,104	91

The general average is drawn from all forty-five descriptions, which are treated as of equal value, and is the simple arithmetic mean as shown above.

Index of Silver Prices

The base of the index numbers given below is 1 gold to 15½ silver = 100, 60·84*d.* per standard ounce being parity.*

	Price per oz. standard	Index number		Price per oz. standard	Index number
	<i>d.</i>			<i>d.</i>	
Average 1873 ...	59½	=97·4	<i>Lowest</i> Nov., 1902	21½	=35·6
" '90-99...	34	=55·8	End Dec., 1906 ...	32½	=53·1
" 1917-26...	40½	=66·6	" Dec., '08 ...	23½	=38·1
" 1893 ...	35½	=58·6	" Dec., '12 ...	29	=47·7
" '96 ...	30½	=50·5	" Dec., '13 ...	26½	=43·7
" 1909 ...	23½	=38·9	" June, '14 ...	26	=42·7
" '14 ...	25½	=41·6	" Dec., '14 ...	22½	=37·3
" '15 ...	23½	=38·9	" Dec., '15 ...	26½	=43·1
" '16 ...	31½	=50·4	" Dec., '16 ...	36½	=58·7
" '17 ...	40½	=65·8	" Dec., '17 ...	43½	=70·0
" '18 ...	47½	=76·4	" Dec., '18 ...	48½	=77·9
" '19 ...	57	=85·3	" Dec., '19 ...	77½	=98·3
" '20 ...	61½	=76·1	" Dec., '20 ...	40½	=49·2
" '21 ...	36½	=48·1	" Dec., '21 ...	34½	=49·3
" '22 ...	34½	=51·6	" Dec., '22 ...	31½	=49·6
" '23 ...	31½	=49·4	" Dec., '23 ...	33½	=49·0
" '24 ...	34	=50·7	" Dec., '24 ...	31½	=50·4
" '25 ...	32½	=52·5	" Dec., '25 ...	31½	=52·1
" '26 ...	28½	=47·1	" Dec., '26 ...	25	=41·1
" '27 ...	26½	=42·8	" Dec., '27 ...	26½	=43·6
" '28 ...	26½	=44·0	" Dec., '28 ...	26½	=43·3
" '29 ...	24½	=40·2	" Dec., '29 ...	21½	=35·2
" '30 ...	17½	=29·0	" Dec., '30 ...	14½	=23·7
" '31 ...	14½	=20·4	" Dec., '31 ...	20½	=21·6
" '32 ...	17½	=19·5	" Dec., '32 ...	16½	=17·2
" '33 ...	18½	=18·7	" Dec., '33 ...	19½	=19·5
" '34 ...	21½	=20·0	" Dec., '34 ...	24½	=22·6
" '35 ...	29	=26·4	" Dec., '35 ...	22½	=20·6
" '36 ...	20½	=18·5	" Dec., '36 ...	21½	=19·4
" '37 ...	20½	=18·4	" Dec., '37 ...	19½	=17·7
" '38 ...	19½	=17·6	" Dec., '38 ...	20½	=17·3

* All the index numbers in the table from 1916 to 1925 inclusive and from 1931 to date are calculated on the basis of the gold prices of silver instead of the sterling prices, though the latter are the price quotations given in the table. In arriving at the index numbers for these dates the prices of gold are taken as follows. For 1916, 1917 and 1918 the price is taken as 86*s.* 9½*d.* per fine oz., derived from the "pegged" New York rate of \$4·76½ to the £. For 1919 the average price of gold is taken as 93*s.* 4½*d.*, this being the parity price with the U.S. dollar, the average New York exchange in that year being \$4·429. For the other dates the index numbers are based on the quotations in the London market for exportable gold. The quotation at the end of 1919 was 109*s.* 8½*d.* per fine oz. At the end of 1920, 1921, 1922, 1923 and 1924 the quotations per fine oz. were 116*s.* 1*d.*, 98*s.* 0*d.*, 88*s.* 11*d.*, 95*s.* 4*d.*, and 88*s.* 2*d.* respectively and the average quotations in these years were 112*s.* 11½*d.*, 107*s.* 0½*d.*, 93*s.* 4*d.*, 90*s.* 3*d.*, and 93*s.* 8½*d.* respectively, while the average price in 1925 was 85*s.* 5½*d.* The prices at the end of 1931, 1932, 1933, 1934, 1935, 1936, 1937 and 1938 were 121*s.* 11*d.*, 123*s.* 9*d.*, 126*s.* 6*d.*, 141*s.* 0*d.*, 141*s.* 2*d.*, 141*s.* 7*d.*, 139*s.* 6*d.*, and 149*s.* 7½*d.* respectively, and the average prices in these years were 92*s.* 6½*d.*, 118*s.* 0½*d.*, 124*s.* 10½*d.*, 137*s.* 7½*d.*, 142*s.* 1½*d.*, 140*s.* 3½*d.*, 140*s.* 8½*d.*, and 142*s.* 6½*d.* respectively.

World's Production of Silver (in millions of ounces)

	United States	Mexico	Canada	Australia	Other Countries	Total
1903... ..	54.3	70.5	3.1	9.7	30.1	167.7
'04... ..	57.7	60.8	3.7	14.5	27.5	164.2
'05... ..	56.1	65.0	5.9	15.0	30.3	172.3
'06... ..	56.5	55.2	8.5	14.2	30.6	165.0
'07... ..	56.5	61.0	12.8	19.0	34.8	184.2
'08... ..	52.4	73.6	22.1	17.2	37.8	203.1
'09... ..	54.7	73.9	27.5	16.3	39.7	212.1
'10... ..	57.1	71.4	32.9	21.5	38.8	221.7
'11... ..	60.4	79.0	32.7	16.6	37.5	226.2
'12... ..	63.8	74.6	31.6	18.1	36.2	224.3
'13... ..	66.8	70.7	31.5	3.5	51.4	223.9
'14... ..	72.4	27.5	28.4	3.6	36.5	168.4
'15... ..	74.9	39.5	28.4	4.1	37.3	184.2
'16... ..	74.4	38.2	25.4	4.2	26.6	168.8
'17... ..	71.7	35.0	22.2	10.0	35.3	174.2
'18... ..	67.8	62.5	21.2	10.0	35.9	197.4
'19... ..	56.7	62.7	15.7	7.4	32.0	174.5
'20... ..	55.5	66.8	12.6	7.5	33.0	175.4
'21... ..	53.1	64.5	13.1	4.9	35.7	171.3
'22... ..	56.2	81.1	18.6	11.3	46.3	213.5
'23... ..	73.3	90.9	17.8	13.3	50.7	246.0
'24... ..	65.3	91.5	19.7	10.8	52.2	239.5
'25... ..	66.1	92.9	20.2	11.1	54.8	245.1
'26... ..	62.7	98.3	22.4	11.2	59.0	253.6
'27... ..	60.4	104.6	22.7	9.0	57.3	254.0
'28... ..	58.4	108.5	21.9	9.0	59.5	257.3
'29... ..	61.2	108.7	23.1	9.0	59.7	261.7
'30... ..	51.0	105.0	26.0	8.9	57.1	248.0
'31... ..	31.0	86.0	21.0	7.6	50.4	196.0
'32... ..	24.0	69.0	18.0	6.5	47.5	165.0
'33... ..	22.8	68.1	15.2	11.0	52.0	169.1
'34... ..	32.5	74.1	16.4	10.8	56.6	190.4
'35... ..	45.6	75.6	16.6	11.4	71.5	220.7
'36... ..	63.4	77.5	18.3	12.7	81.8	253.7
'37... ..	71.3	84.7	22.7	14.3	80.9	273.9
'38*	60.8	85.0	23.3	95.1		264.2

* Provisional. (Estimate by Messrs. Samuel Montague & Co.).

As the table shows, the average price of silver in 1938 was again lower than in the previous year. After the ending of the International Silver Agreement of 1933 in 1938, the effective determinant of the price was the buying price for imports fixed by the United States Authorities which remained unchanged at 43 cents per oz. As a result, the uncertainty whether this price would be maintained, owing to the dispute with Mexico and for other reasons, the forward price fell generally well below the spot price on bear selling for the greater part of the year. World production (figures for which are taken from Annual Reports of the United States Director of the Mint) was slightly below that of the previous year, though remaining at a very high level.

Gold.—The table below shows the world's annual gold production since 1851. Prior to 1911 the estimates are those of the Bureau of the U.S. Mint and other authorities. The estimates since 1926 are those of the Union Corporation Limited. The value is taken throughout at £4.25 per fine oz. The figures show clearly the increase in output caused by the departure of the large producing countries from the gold standard (especially the departure of South Africa at the end of 1932).

(000's omitted)

Year	Value of output £	Year	Value of output £
1851	17,200	1895	40,843
'52	26,550	'96	41,559
'53	31,090	'97	48,509
'54	25,490	'98	58,949
'55	27,015	'99	63,027
'56	29,520	1900	52,312
'57	26,655	'01	53,630
'58	24,930	'02	60,975
'59	24,970	'03	67,337
'60	23,850	'04	71,380
'61	22,760	'05	78,143
'62	21,550	'06	82,707
'63	21,390	'07	84,857
'64	22,600	'08	90,995
'65	24,040	'09	93,302
'66	24,220	'10	93,544
'67	22,805	'11	94,930
'68	21,945	'12	95,783
'69	21,245	'13	97,481
'70	21,370	'14	92,709
'71	25,400	'15	97,114
'72	24,200	'16	92,597
'73	23,600	'17	87,236
'74	22,950	'18	78,605
'75	22,700	'19	73,078
'76	22,540	'20	68,522
'77	23,830	'21	67,848
'78	22,020	'22	66,723
'79	21,400	'23	77,888
'80	22,130	'24	81,807
'81	21,150	'25	82,267
'82	20,500	'26	82,211
'83	20,640	'27	82,582
'84	20,830	'28	82,400
'85	21,250	'29	84,500
'86	21,430	'30	88,500
'87	21,735	'31	95,100
'88	22,644	'32	103,400
'89	25,375	'33	107,700
'90	24,421	'34	116,000
'91	26,846	'35	125,700
'92	30,134	'36	140,700 *
'93	32,363	'37	147,800 *
'94	37,229	'38 (provisional)	156,200

* Amended figures.

*Average Prices of Commodities **

No. of Article	0	1 Wheat		3	4	5	6	7	8	1-8	9	10
Year	Silver †	English Gazette	American	Town Made white (now "G.R.")	English Gazette	English Gazette	American Mixed	Good English	Rangoon Cargoes to Arrive	Vegetable Food	Prime	Mid-dling
	d. per oz.	s. and d. per qr.	s. and d. per qr.	s. per sack (280 lbs.)	s. and d. per qr.	s. and d. per qr.	s. per qr.	s. per ton	s. and d. per cwt.	Total	d. per 8 lbs.	d. per 8 lbs.
1873 ...	59½	58·8	63	51	40·5	25·5	30	160	9·6	—	65	56
1918 ...	47½	72·9	78·7	46½	59·0	49·3	78½	142½	26·2	—	103	103
'19 ...	57	72·10	74·10	46½	75·8	52·3	78½	198½	25·10	—	108	108
'20 ...	61 ⁹ / ₈	80·7	92·4	66	90	57·4	90½	242½	41·10	—	125	125
'21 ...	36½	72·9	73·9	64½	54·4	34·5	38½	198	18·5	—	115	109½
'22 ...	34 ⁷ / ₈	47·10	52·11	45½	40·1	29·1	31½	130	14·10	—	88½	82
'23 ...	31½	42·2	47·3	39½	33·8	26·8	36	101	14·10	—	79½	74½
'24 ...	34	49·3	53·9	43½	46·9	27·2	39½	186	16·9	—	82½	76½
'25 ...	32½	52·2	62·4	50½	42·0	27·2	38 ⁹ / ₁₆	154	16·0	—	80	73½
'26 ...	28½	53·3	58·9	49½	36·11	25·1	29½	127	16·3	—	74	67
'27 ...	26½	49·3	58·3	44 ⁹ / ₁₆	42·0	25·4	30½	136	15·11	—	70	62
'28 ...	26½	44·8	50·10	40½	39·0	29·0	38½	133	15·0	—	74	66½
'29 ...	24 ⁷ / ₈	42·2	51·3	38½	35·5	24·7	36½	111	14·3	—	71	66
'30 ...	17½	34·3	36·10	33½	28·3	17·2	23	93	13·0	—	73	68
'31 ...	14½	24·0	25·1	22½	28·0	17·8	15 ⁹ / ₁₆	146	9·8	—	67	61
'32 ...	17½	25·0	27·5	24½	27·1	19·3	18½	152	9·8	—	65	59
'33 ...	18½	22·10	25·7	23½	28·7	15·10	17½	86	7·9	—	61	52
'34 ...	21½	20·2	28·0	23½	30·11	17·5	19½	97	7·8	—	58	52
'35 ...	29	22·2	31·1	25½	28·7	18·9	17½	107	8·10	—	54	49
'36 ...	20 ¹ / ₈	30·9	35·1	31½	29·5	17·8	19½	146	9·0	—	54	50
'37 ...	20½	40·0	49·7	40½	39·0	23·11	26 ⁹ / ₁₆	136	10·5	—	61	57
'38 ...	19½	28·11	39·3	30½	36·4	21·2	28½	111	10·7	—	62	58
Average												
1904-13	26½	31½	36	30	25½	18½	24½	78	7½	—	51	44½
1890-99	34	28½	31½	27½	25½	17½	19½	72	6½	—	47	37½
'78-87	50	40	43½	34½	31½	21	25	102	8	—	55½	46
'67-77	58½	54½	56	46	39	26	32½	117	10	—	59	50

Index Numbers (or Percentages) of Prices, the Average of 1867-77 being 100

1873 ...	97·4	108	113	104	104	98	92	137	95	851	110	112
1918 ...	76·4	134	140	102	151	190	241	122	262	1,342	174	207
'19 ...	85·3	134	134	102	194	201	242	170	258	1,435	183	216
'20 ...	76·1	148	165	143	231	221	279	207	418	1,812	212	250
'21 ...	48·1	133	132	140	139	132	118	169	184	1,147	195	220
'22 ...	51·6	88	95	100	103	112	96	111	148	853	150	164
'23 ...	49·4	77	84	86	86	103	111	86	148	781	134	149
'24 ...	50·7	90	96	95	120	105	122	159	167	954	139	152
'25 ...	52·5	96	111	109	108	105	119	132	160	940	136	147
'26 ...	47·1	98	105	107	95	96	92	109	163	865	125	134
'27 ...	42·8	90	104	98	108	97	95	116	159	867	119	124
'28 ...	44·0	82	91	87	100	112	118	114	150	854	125	133
'29 ...	40·2	77	91	84	91	95	112	95	143	788	120	132
'30 ...	29·0	63	66	72	72	66	71	79	130	619	124	136
'31 ...	20·4	44	45	50	71	68	48	125	93	544	114	122
'32 ...	19·5	46	49	53	69	74	58	130	93	572	110	118
'33 ...	18·7	42	46	52	73	61	53	74	78	479	103	104
'34 ...	20·0	37	50	50	79	67	60	83	77	503	98	104
'35 ...	26·4	41	56	56	73	72	53	91	88	530	92	98
'36 ...	18·5	56	63	69	75	68	60	125	90	606	92	100
'37 ...	18·4	73	89	88	100	92	82	116	105	745	103	114
'38 ...	17·6	53	70	67	93	81	86	95	106	651	105	116

* The annual prices are the average monthly or weekly quotations, except potatoes, which are the average weekly quotations during the eight months January to April and September to December.

† Not included in the general average.

‡ Meat (9-13), by the carcase, in the London Central Meat Market.

§ La Plata from 1924.

Average Prices of Commodities—Contd.

No. of Article	11	12	13	14	15	9-15	16A	16B	17	18A*	18B*	18
	Mutton		Pork	Bacon	Butter		Sugar			Coffee		
Year	Prime	Mid-ling	Large and Small, average	Water-ford	Friesland, Fine to Finest	Animal Food Total	British West Indian Refining || s. per cwt.	Beet, German, 88 p. c., f.o.b. s. per cwt.	Java, Floating Cargoes \$ s. per cwt.	Ceylon Plantation, Low Mid-ling † s. per cwt.	Rio, Good s. per cwt.	Mean 18A at 18B
1873 ...	71	63	54	81	123	—	22½	25	28	100	86	—
1918 ...	109½	109½	128½	183	247½	—	33	26½	35½	128½	69	—
'19 ...	114	114	128	190½	252	—	38½	34½	43½	145½	114½	—
'20 ...	144½	144½	168½	239½	301	—	58	65½	74½	148	111½	—
'21 ...	130½	125½	121½	179	250	—	19½	18½	22	120½	63	—
'22 ...	125	121½	101	145½	202½	—	15	14½	15½	120½	74½	—
'23 ...	114½	107½	89	113½	186	—	25½	23½	24½	117	55	—
'24 ...	111½	103½	70	106	211	—	23½	20½	21½	152½	85½	—
'25 ...	106½	98½	84½	128½	206½	—	16½	11½	12½	153½	98½	—
'26 ...	89	80½	98½	130	173	—	16½	11½	12½	154½	89½	—
'27 ...	86	79½	85	102½	178	—	16½	12½	13½	143½	71½	—
'28 ...	92½	87	77	101½	185½	—	13½	10½	11½	143½	81½	—
'29 ...	89½	83	91	116½	180½	—	11½	8½	8½	141½	74½	—
'30 ...	92	86	89	105½	146½	—	8½	5½	6½	106½	42½	—
'31 ...	79	73	65	83½	130	—	7½	5½	6½	101½	33½	—
'32 ...	63	55	54	77	126½	—	7½	5½	5½	105½	54½	—
'33 ...	69	63	60	81½	105½	—	7½	4½	5½	86½	42½	—
'34 ...	74	70	65	90½	79½	—	6½	4½	4½	87	42½	—
'35 ...	75	70	62	89	92½	—	6½	3½	4½	67½	29½	—
'36 ...	73	68	65	93½	98½	—	6½	3½	4½	58½	30½	—
'37 ...	78	74	68	94	108½	—	7½	5½	6½	75½	36½	—
'38 ...	62	56	69	97½	114½	—	7½	4½	5½	75	19½	—
Average												
1904-13	58½	51½	47½	67	113	—	10½	10½	12	75½	43½	—
1890-99	54½	41½	42½	59	100	—	11½	11½	13½	98	62	—
'78-87	64½	53	49	71	116	—	17	18	21½	78	52	—
'67-77	63	55	52	74	125	—	23	24	28½	87	64	—

Index Numbers (or Percentages) of Prices, the Average of 1867-77 being 100

	113	114	104	109	98	760	101	98	115*	134*	125
1873 ...	113	114	104	109	98	760	101	98	115	134	125
1918 ...	174	199	248	247	198	1,447	127	125	148	110	129
'19 ...	181	207	246	258	202	1,493	155	153	167	180	174
'20 ...	230	263	324	324	241	1,844	263	262	170	174	172
'21 ...	208	228	234	242	200	1,527	81	77	140	98	119
'22 ...	199	221	194	196	162	1,286	62	54	140	116	128
'23 ...	182	196	171	154	149	1,135	104	87	135	86	111
'24 ...	177	188	135	143	169	1,103	93	75	175	133	154
'25 ...	169	180	162	174	165	1,133	60	43	176	154	165
'26 ...	141	146	190	176	138	1,050	60	44	178	139	159
'27 ...	136	145	163	138	142	967	62	47	165	112	139
'28 ...	146	158	148	137	149	996	51	40	165	127	146
'29 ...	142	151	175	157	144	1,021	42	31	162	117	140
'30 ...	146	155	171	143	117	992	31	22	123	66	95
'31 ...	125	133	125	113	104	836	29	23	120	53	87
'32 ...	100	100	104	104	101	737	27	20	121	85	103
'33 ...	110	114	115	110	84	740	25	18	100	66	83
'34 ...	117	127	125	122	64	757	22	16	100	67	84
'35 ...	119	127	119	120	74	749	21	17	78	46	62
'36 ...	116	124	125	127	79	763	21	17	67	48	58
'37 ...	124	135	131	127	86	820	28	23	87	57	72
'38 ...	98	102	133	131	92	777	24	19	86	31	59

* Index numbers not included in general average.

† East India good middling from 1908.

‡ Raw Centrifugals, 96 per cent. Pol., from 1924.

‡ Comparative values.

|| White Javas, C.I.F., from 1924.

Average Prices of Commodities—Contd.

No. of Article	19A*	19C*	19B*	19	16-19	1-19	20A	20B	21	22	—	23
	Tea						Iron			Copper		Tin
	Congou, Common	Indian, Good Medium	Average Import Price	Mean of 19A and 19B	Sugar, Coffee, and Tea Total	Food Total	Scottish Pig	Cleveland (Mid-dles-brough) Pig	Bars, Common	Stand-ard	English Tough Cake	Straits
Year	d. per lb.	d. per lb.	d. per lb.				s. and d. per ton	s. and d. per ton	per ton	per ton	£ per ton	£ per ton
1873 ...	12	—	16.67	—	—	—	117.3	—	12½	84	92	132
1918 ...	20½	16	15.0	—	—	—	101.0	95.0	14	115½	126	331
'19 ...	13½	15	15.5	—	—	—	143.1	137.1	19½	92	99½	257
'20 ...	11¼†	9½	14.97	—	—	—	214.11	208.11	28½	97½	112½	302
'21 ...	4½	7	12.4	—	—	—	168.6	137.4	19½	69½	72½	171
'22 ...	8½	13½	14.9	—	—	—	99.10	90.7	11½	63½	66½	162
'23 ...	11	17½	17.58	—	—	—	108.0	108.9	11½	65½	69½	206
'24 ...	9½	17½	19.0	—	—	—	96.8	88.2	12½	63½	67½	251
'25 ...	7½	14½	18.34	—	—	—	83.4	72.8	11½	61½	65½	267
'26 ...	7½	16½	18.82	—	—	—	87.2	87.6	11½	58½	63½	297
'27 ...	6½	14½	18.58	—	—	—	80.5	73.0	11½	55½	60½	303½
'28 ...	6½	12½	16.84	—	—	—	69.9	65.9	9½	63½	66½	229
'29 ...	6½	11½	16.11	—	—	—	74.0	70.3	9½	75½	78½	207½
'30 ...	5½	9½	15.12	—	—	—	76.0	67.0	9½	54½	58½	144½
'31 ...	4½	6½	13.29	—	—	—	71.0	58.6	10½	39½	38½	121½
'32 ...	4½	5½	10.75	—	—	—	68.2	58.6	10	31½	33½	140
'33 ...	6½	8½	11.87	—	—	—	66	62.3	9½	32½	34½	202½
'34 ...	8½	12	13.20	—	—	—	69.6	66.11	9½	30½	32½	232½
'35 ...	6½	10½	13.06	—	—	—	70.6	67.10	9½	32½	34½	230½
'36 ...	6½	11½	13.19	—	—	—	78.6	73.2	10½	37½	41½	207½
'37 ...	6½	13½	14.58	—	—	—	104.6	94.4	12½	54½	59½	246½
'38 ...	6½	11½	14.04	—	—	—	118.0	109	13½	41½	45½	193½
Average 1904-13	7½	7½	8½	—	—	—	57½	51½	6½	67½	72	164½
1890-99	4½	7½	9½	—	—	—	47	41½	5½	50	53	81
'78-87	6½	—	12½	—	—	—	46	38	5½	55	60	89
'67-77	11½	—	17½	—	—	—	69	60	8½	75	81	105

Index Numbers (or Percentages) of Prices, the Average of 1867-77 being 100

	1873 ...	1918 ...	'19 ...	'20 ...	21 ...	'22 ...	'23 ...	'24 ...	'25 ...	'26 ...	'27 ...	'28 ...	'29 ...	'30 ...	'31 ...	'32 ...	'33 ...	'34 ...	'35 ...	'36 ...	'37 ...	'38 ...
	107	186	120	100	39	77	98	82	70	69	60	56	54	46	42	38	58	77	60	56	58	58
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	97	87	90	88	72	86	102	110	106	109	108	98	93	88	78	62	68	77	76	76	85	81
	102	137	105	94	55	82	100	96	88	89	84	77	74	67	60	50	63	77	68	66	72	70
	426	518	587	791	332	326	402	418	356	352	332	314	287	215	199	200	189	199	168	162	195	172
	2,037	3,307	3,515	4,447	3,006	2,465	2,318	2,475	2,429	2,267	2,166	2,164	2,096	1,826	1,579	1,509	1,408	1,459	1,447	1,531	1,760	1,600
	170	152	217	329	237	148	168	143	121	135	119	105	112	111	100	98	99	106	107	118	154	176
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	152	170	234	343	232	136	144	152	144	139	136	120	118	121	123	121	117	116	117	123	149	161
	112	154	123	130	92	84	88	84	82	77	74	85	101	73	52	43	44	40	43	50	73	56
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	126	315	245	288	163	154	196	239	254	283	289	219	198	138	115	131	193	221	219	198	235	185

* Index numbers not included in the general average.

† Approximate.

‡ Nominal.

Average Prices of Commodities—Contd.

No. of Article }	24	25A	25B	26	20-26	27	28	29A	29B	30A	30B	31
	Lead		Coal			Cotton		Flax		Hemp		Jute
Year	English Pig	Wallsend Hetton in London	New-castle Steam	Average Export Price	Minerals	Mid-dling American	Fair Dhol-eralah ||	Petro-grad	Russian Average Import Price	Manila Fair Roping	Petro-grad Clean (a)	Good Medium +
	£ per ton	£ s. per ton	£ s. per ton	£ s. per ton	Total	d. per lb.	d. per lb.	£ per ton	£ per ton	£ per ton.	£ per ton	£ per ton
1873 ...	23½	32	—	20-90	—	9	6 ⅜	47½	44	43	36	18
1918 ...	32½	33-6	33½	30-6	—	22-3	17 ⅜	120½	156½	90½	166½	39½
'19 ...	29½	45-3	45½	46-2	—	19-65	14 ⅜	120½	174½	58½	147½	50½
'20 ...	40	32	51½	79-8	—	23-14	13½	120½	345½	65½	145½	44½
'21 ...	24½	32½	29	34-83	—	9-4	5 ⅜	112½	118½	40½	145½	27½
'22 ...	25½	34½	24½	24-16	—	12-10	8	95	84½	33½	57½	30½
'23 ...	28½	32½	28	25-13	—	15-25	10	83½	84½	33½	57	26
'24 ...	35½	27½	22	23-38	—	16-26	11-03	120	104½	44	81	31½
'25 ...	37 ⅞	29½	16½	20-08	—	12-64	11-01	92½	120½	46½	89½	49 ⅞
'26 ...	32½	**30 ⅞	**16 ⅞	18-59	—	9-40	7-75	65	72 ⅞	43	74½	43½
'27 ...	25 ⅞	23½	14½	17-80	—	9-54	8-27	95 ⅞	74 ⅞	43½	66 ⅞	32½
'28 ...	22 ⅞	21 ⅞	13½	15-67	—	10-92	8-66	98½	91 ⅞	37 ⅞	63 ⅞	33 ⅞
'29 ...	24½	23½	15½	16-13	—	10-26	7-73	76 ⅞	71 ⅞	37 ⅞	61	32
'30 ...	19½	24½	14½	16-64	—	7-49	5-12	53½	60 ⅞	26½	48 ⅞	20
'31 ...	14 ⅞	24½	13½	15-98	—	5-90	4-60	36	35 ⅞	18½	27½	15 ⅞
'32 ...	13 ⅞	23½	13½	16-27	—	5-24	4-85	45 ⅞	42 ⅞	18½	36	16 ⅞
'33 ...	13½	22½	13½	16-08	—	5-54	4-53	51½	48½	15½	37	14½
'34 ...	12½	20½	14½	16-08	—	6-70	4-80	60½	50½	14½	42 ⅞	14 ⅞
'35 ...	16	20½	14½	16-30	—	6-71	5-42	79½	72 ⅞	19½	43½	16½
'36 ...	19 ⅞	23½	15½	16-98	—	6-71	5-12	63½	60½	28½	42 ⅞	17 ⅞
'37 ...	24 ⅞	24½	20½	19-05	—	6-21	4-80	78½	70½	34½	38½	19½
'38 ...	17 ⅞	25½	18½	21-32	—	4-93	3-67	66½	63½	21½	38½	17 ⅞
Average	15½	18½	11½	11½	—	6½	5	32½	36½	30½	31½	18½
1904-13	12	17½	10½	10½	—	4½	3	27	27	26½	25	12½
1890-99	14	16½	9	9	—	6	4½	33	34	35½	26½	15½
'78-87	20½	22	12½	12½	—	9	6½	46	48	43	35	19

Index Numbers (or Percentages) of Prices, the Average of 1867-77 being 100

1873 ...	117	145	—	167	989	100	92	97	101	95
1918 ...	158	153	—	245	1,347	248	253	294	341	207
'19 ...	143	206	—	370	1,538	218	219	313	264	264
'20 ...	195	145	—	638	2,068	257	203	495	270	236
'21 ...	118	147	—	279	1,268	104	86	246	237	145
'22 ...	123	156	—	193	994	134	118	191	116	162
'23 ...	139	147	—	201	1,083	169	148	179	116	137
'24 ...	175	125	—	187	1,105	181	163	239	160	167
'25 ...	183	135	—	161	1,080	140	163	227	174	261
'26 ...	157	138	—	149	1,078	104	115	147	151	231
'27 ...	125	105	—	142	990	106	123	181	141	172
'28 ...	109	97	—	125	860	121	128	203	130	178
'29 ...	117	106	—	129	881	114	114	157	126	168
'30 ...	95	113	—	133	784	83	76	121	96	105
'31 ...	71	112	—	127	700	66	68	76	58	84
'32 ...	65	106	—	130	694	58	72	93	70	85
'33 ...	65	103	—	129	750	62	67	106	68	78
'34 ...	61	92	—	129	765	74	71	119	73	74
'35 ...	78	92	—	130	786	74	80	161	80	89
'36 ...	95	105	—	136	825	74	76	133	91	93
'37 ...	121	111	—	152	995	69	71	158	93	104
'38 ...	83	117	—	171	949	55	54	139	77	93

* Approximate prices.

† Now No. 1 Oomra, Fine.

†† Lightnings from 1931.

‡ Approximate.

§ Livonian Z.K. from 1921.

(a) Russian Sirets Group 1, Sort 1 from 1931-33; Jugo-Slav Peasant from 1934.

‡ Nominal.

§ Best Yorkshire house after 1916.

** Average price January-April, 1936.

Average Prices of Commodities—Contd.

No. of Article }	Year	32A	32B	33	34	27-34	35A	35B	35C	36A	36B	37
		Wool			Silk	Textiles Total	Hides			Leather		Tallow
		Merino, Port Phillip, Average Fleece d.* per lb.	Merino, Adelaide, Average Greasy d. per lb.	English, Lincoln Half Hogs d. per lb.	Tsatlee † s. per lb.		River Plate, Dry d. per lb.	River Plate, Salted d. per lb.	Average Import Price d. per lb.	Dressing Hides d. per lb.	Average Import Price d. per lb.	Town s. per cwt.
1873 ...		25	11½	24½	21½	—	11	8½	—	18½	—	44
1918 ...		47½	23½	18½	25½	—	20½	13½	15-9	32½	32½	81½
'19 ...		67	32½	22½	26	—	22½	19½	17-1	36½	40½	87½
'20 ...		79½	32	22	38½	—	20½	18½	20-1	43½	71½	75
'21 ...		31½	11½	8½	26½	—	9½	8½	9-58	25½	46½	36½
'22 ...		39	17½	9½	28½	—	9½	8½	8-06	24½	36	34½
'23 ...		43½	20½	12	24½	—	9½	8½	8-23	23½	31½	36½
'24 ...		53½	25½	18½	23½	—	10½	8½	8-63	22½	33½	42½
'25 ...		41½	17½	17½	18½	—	11½	8½	9-87	23	33	42½
'26 ...		36½	16½	15	15½	—	10½	8	9-32	21½	35½	38½
'27 ...		38½	17½	15½	15½	—	12½	10½	9-85	22½	36½	33½
'28 ...		37	17½	17½	14	—	15½	11½	12-09	23½	37½	36½
'29 ...		35½	13½	16½	13½	—	10½	8½	10-80	19½	38½	36½
'30 ...		18½	8½	10½	10½	—	6½	6½	7-80	18½	33½	28½
'31 ...		14-7	7-1	8½	8½	—	5½	5½	6-12	17½	32½	19½
'32 ...		15-0	7-2	5½	8½	—	4½	4½	5-47	17½	28½	21½
'33 ...		19-9	9-3	5½	6½	—	5½	4½	5-65	17½	26½	19½
'34 ...		21½	10-4	7	5½	—	4½	4½	5-71	17½	25½	17½
'35 ...		20-1	9-5	7½	5½	—	5½	5½	5-51	17½	25½	24½
'36 ...		24-7	12-2	10½	5½	—	6½	6	6-47	17½	27½	23½
'37 ...		26-9	12-7	16-9	8½	—	8½	7½	8-62	18½	28½	23½
'38 ...		18-6	8-9	11-9	7½	—	6½	5½	6-35	14½	24½	17½
Average												
1904-13		17½	9	10½	11½	—	9½	7½	6½	16	17	31½
1890-99		13½	6½	10	11½	—	6½	5½	5	13½	13½	25
'78-87		18½	8½	11½	15	—	8½	6½	6½	15	17	35½
'67-77		21½	9½	19½	23	—	9	7	6½	16	18½	45
Index Numbers (or Percentages) of Prices, the Average of 1867-77 being 100												
1873 ...		118	—	124	95	822	120	—	—	114	—	97
1918 ...		222		95	112	1,772	218			188		182
'19 ...		315		114	113	1,820	258			222		195
'20 ...		359		111	168	2,099	257			330		167
'21 ...		140		44	115	1,117	123			205		81
'22 ...		180		49	125	1,075	114			174		77
'23 ...		206		61	105	1,121	113			158		81
'24 ...		254		96	102	1,362	119			163		94
'25 ...		188		87	79	1,319	132			161		94
'26 ...		170		76	69	1,063	121			164		85
'27 ...		177		78	67	1,045	142			172		75
'28 ...		174		91	61	1,086	172			176		82
'29 ...		156		81	60	976	129			166		81
'30 ...		86		54	48	669	92			150		64
'31 ...		70		43	39	504	77			146		43
'32 ...		71		29	35	513	66			132		47
'33 ...		94		30	29	534	68			127		44
'34 ...		102		35	24	572	67			123		39
'35 ...		96		37	24	641	69			125		55
'36 ...		119		53	25	646	82			129		52
'37 ...		127		86	37	745	109			134		52
'38 ...		88		60	35	601	81			110		39

* Port Phillip fleece washed nominal since 1896, exactly in proportion with the value of clean wool.

† Common New Style from 1921 to 1936. China, Extra "A" from 1937.

Average Prices of Commodities—Contd.

No. of Article }	38	39	40A	40B	41	42	43	44	45A	45B	35—45	20—45	1—4
	Oil			Seeds		Soda			Timber		Sundry Materials	Materials	Gran Total
Year	Palm	Olive	Lin-seed	Lin-seed	Petroleum *	Crystals	Nitrate of Soda	Indigo	Hewn, Average Import Price.	Sawn or Split, Average Import Price	Total	Total	
	£ per ton	£ per ton	£ per ton	s. per qr.	d. per gall.	s. per ton	s. per cwt.	s. per lb.	s. per load	s. per load			
1873 ...	38	43	32	62	15½	100	15½	6½	65	62	—	—	—
1918 ...	44½	198½	63½	131½	21½	82½	27½	9	107½	271	—	—	—
'19 ...	69½	200½	92½	139½	17½	118½	24½	9½	137½	232½	—	—	—
'20 ...	69½	200½	88½	157	25½	150½	24½	14½	119½	261½	—	—	—
'21 ...	36½	80½	31½	72½	22½	140	18½	11½	68½	156½	—	—	—
'22 ...	34½	75½	39½	75½	15	123	14½	9½	46	117½	—	—	—
'23 ...	36½	66½	42½	77½	13	103	13½	7½	48	131½	—	—	—
'24 ...	40½	79½	42½	81½	13½	101½	13½	6½	49½	122	—	—	—
'25 ...	40½	73½	43½	80½	13½	100	13½	5½	47½	122½	—	—	—
'26 ...	37½	79½	32½	63½	13	100	13½	5½	48½	107	—	—	—
'27 ...	34½	102½	31½	64½	13	100	12½	5½	45½	107½	—	—	—
'28 ...	35½	80½	29½	66½	11½	100	10½	5½	45½	111½	—	—	—
'29 ...	34½	72	35½	74½	12½	100	10½	5½	44½	107½	—	—	—
'30 ...	25½	52½	36½	61½	12½	100	9½	5½	44½	102½	—	—	—
'31 ...	19½	53½	18½	38½	11½	100	9½	5½	37½	83½	—	—	—
'32 ...	17½	57½	17	38½	10½	100	8½	5½	35½	75½	—	—	—
'33 ...	15½	53½	20½	39½	10½	100	8½	5½	31½	75½	—	—	—
'34 ...	13½	62½	21½	42½	10½	100	7½	5½	31½	79½	—	—	—
'35 ...	19½	61½	24½	43½	10½	100	7½	5½	32½	73½	—	—	—
'36 ...	19½	70½	28½	48½	10½	100	7½	5½	37½	78½	—	—	—
'37 ...	22½	95½	31½	54½	10½	100	7½	5½	58½	103½	—	—	—
'38 ...	14½	68½	26½	46½	10½	100	8	5½	61½	94½	—	—	—
Average 1904—13	31½	43½	26½	49½	6½	60	10½	3	38	56	—	—	—
1890—99	24½	35	19½	38	5½	53	8½	4½	40	45	—	—	—
'78—87	32½	40	23	46	6½	62	12½	6	47	47	—	—	—
'67—77	39	50	30	60	12½*	92	14	7½	60	54	—	—	—
Index Numbers (or Percentages) of Prices, the Average of 1867—77 being 100													
1873 ...	97	86	105	122	109	110	92	111	1,163	2,974	5,011		
1918 ...	115	396	216	170	90	194	124	332	2,225	5,344	8,651		
'19 ...	178	400	258	138	128	177	126	325	2,405	5,763	9,278		
'20 ...	179	400	272	203	164	177	200	335	2,684	6,851	11,208		
'21 ...	95	160	116	177	152	135	158	198	1,600	3,985	6,991		
'22 ...	89	151	127	122	134	102	128	143	1,361	3,430	5,895		
'23 ...	93	133	134	104	112	96	103	157	1,284	3,488	5,806		
'24 ...	103	160	138	105	111	97	84	151	1,325	3,792	6,267		
'25 ...	104	147	137	105	109	96	79	150	1,314	3,713	6,142		
'26 ...	96	159	106	104	109	95	78	137	1,254	3,395	5,662		
'27 ...	88	205	107	104	109	90	76	134	1,302	3,337	5,503		
'28 ...	92	161	108	94	109	78	76	138	1,286	3,232	5,396		
'29 ...	89	144	122	102	109	73	76	134	1,225	3,082	5,178		
'30 ...	65	104	110	102	109	70	76	129	1,071	2,524	4,350		
'31 ...	51	108	63	90	109	65	76	106	934	2,138	3,717		
'32 ...	45	114	61	84	109	62	76	97	893	2,100	3,609		
'33 ...	40	108	67	82	109	60	76	94	875	2,159	3,567		
'34 ...	35	124	71	80	109	56	76	97	877	2,214	3,673		
'35 ...	50	123	75	84	109	54	76	92	912	2,339	3,786		
'36 ...	51	140	85	81	109	54	79	102	964	2,453	3,984		
'37 ...	58	192	95	86	109	56	79	142	1,112	2,852	4,612		
'38 ...	38	137	81	87	109	57	79	136	954	2,504	4,104		

* Petroleum average, 1873—77.

† Nominal.

MISCELLANEA.

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THE ADJUSTMENT OF THE WEIGHTS OF COMPOUND INDEX NUMBERS
BASED ON INACCURATE DATA.

By F. YATES, Sc.D.

WHEN it is desired to construct an index representing a complex entity, such as agricultural or industrial production for a series of years, or in a number of districts, it frequently happens that the component parts that go to make up this entity have been determined with very different accuracy. The question then arises, whether account should be taken of this variation in accuracy, and if so how.

It is assumed that the specification of the required entity is known. Thus agricultural production might be defined as the value of all agricultural produce ultimately available for human consumption, due allowance being made for imported feeding stuffs, produce consumed by the farmer himself, payments in kind, etc. The question of the need for specification is discussed by Kendall in a paper recently read before the Society, and published in the last number of the *Journal*, and by other speakers at the meeting.

While it is true that in the case of agricultural production data for the construction of such a quantitative measure are not at present widely available, sampling surveys of the type conducted by the Cambridge School of Agricultural Economics have shown that there is no insuperable difficulty in obtaining such data.

Any well-planned sampling survey should be so conducted that the sampling errors to which the various estimates are subject are capable of estimation from the results of the survey. To effect this it is necessary to introduce some element of randomization into the sampling. Such randomization, if properly planned and carried out, will automatically eliminate biases from the results.

Suppose that, armed with the results of such a survey, it is required to estimate for each of a number of districts, or for each of a number of years, an entity defined by

$$\Xi = \beta_1 \xi_1 + \beta_2 \xi_2 + \dots + \beta_p \xi_p$$

where $\xi_1, \xi_2, \dots, \xi_p$ are quantities, varying from district to district or year to year, representing the true values of the component parts,

and $\beta_1, \beta_2, \dots, \beta_p$ are constants (price coefficients, etc.), whose values are determined by the definition of the entity. Instead of the function

$$X_0 = \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_p x_p$$

it is required to determine a function

$$X = b_0 + b_1 x_1 + b_2 x_2 + \dots + b_p x_p$$

where x_1, x_2, \dots, x_p are the values of $\xi_1, \xi_2, \dots, \xi_p$ estimated from the survey, and b_1, b_2, \dots, b_p are weighting constants to be determined, the function being such that differences between the different districts or years are represented as accurately as possible—i.e., such that

$$V(X - \Xi) \text{ is minimum.}$$

If the conditions of random sampling are satisfied

$$x_1 = \xi_1 + e_1, x_2 = \xi_2 + e_2, \dots$$

where e_1, e_2, \dots represent random sampling errors which are uncorrelated with ξ_1, ξ_2, \dots

Let the variances and covariances of ξ_1, ξ_2, \dots be represented by

$$u_{11} = V(\xi_1), u_{12} = \text{Cov}(\xi_1 \xi_2), \dots$$

and those of e_1, e_2, \dots by

$$v_{11} = V(e_1), v_{12} = \text{Cov}(e_1 e_2), \dots$$

Actually, of course, the u 's will be determined from the differences of the total variances and covariances of the x 's over all districts or years and their sampling variances and covariances.

We have

$$\begin{aligned} V(X - \Xi) &= (b_1 - \beta_1)^2 u_{11} + 2(b_1 - \beta_1)(b_2 - \beta_2)u_{12} + \dots \\ &\quad + b_1^2 v_{11} + 2b_1 b_2 v_{12} + \dots \end{aligned}$$

Differentiating with respect to b_1, b_2, \dots in turn, and equating to zero, we obtain the p linear equations

$$\begin{aligned} b_1 (u_{11} + v_{11}) + b_2 (u_{12} + v_{12}) + \dots + b_p (u_{1p} + v_{1p}) \\ = \beta_1 u_{11} + \beta_2 u_{12} + \dots + \beta_p u_{1p} \\ b_1 (u_{12} + v_{12}) + b_2 (u_{22} + v_{22}) + \dots + b_p (u_{2p} + v_{2p}) \\ = \beta_1 u_{12} + \beta_2 u_{22} + \dots + \beta_p u_{2p} \end{aligned}$$

These equations serve to determine the p coefficients b_1, b_2, \dots, b_p .

This procedure is analogous to that adopted in the formation of discriminant functions (Fisher, 1938), the final equations being identical with those obtained by Fairfield Smith (1936) in a somewhat similar problem.

The mean of the X 's given by the above b 's will not be equal to

the mean of the X_0 's. It is therefore advisable to introduce the additional constant b_0 given by

$$b_0 = (\beta_1 - b_1) \bar{x}_1 + (\beta_2 - b_2) \bar{x}_2 + \dots$$

If the interest centres in the actual values, rather than in the differences between the different districts or years, then it will be necessary to minimize

$$S(X - \Xi)^2.$$

The constant b_0 now enters directly into the equations, which, after simplification, reduce exactly to those already given.

The limitations of such an adjusted index must be clearly realized. Although it reduces the discrepancies between the true and the estimated values to a minimum, it inevitably introduces certain distortions in the process. In particular it may be misleading if we require to estimate the differences in production between a group of districts having a high value of some variate correlated with one or more of the ξ 's and a group having a low value of the same variate. It is, in fact, always advisable to tabulate the values of X_0 given by the unadjusted weights as well as those of X .

Moreover, the variance of X is always less than the variance not only of X_0 , but also of Ξ , being in fact

$$V(X) = b_1\beta_1u_{11} + (b_1\beta_2 + b_2\beta_1)u_{12} + \dots$$

At first sight this is perhaps startling, but in fact it provides the justification for a practice implicitly recognized by practical statisticians, but rarely explicitly stated—namely, that of reducing very high estimates and increasing very low ones when dealing with inaccurate material, as for example when making estimates of crop yields based on returns which are subject to considerable errors.

The analogy with partial regressions should also be noted. X is the partial regression function that would be obtained if the true values of the Ξ 's were known and their regression on the observed x 's determined.

It is a well-known property of regressions (though one which is occasionally overlooked) that when the independent variates are subject to error, the regression coefficients obtained by the ordinary methods will in general (subject to the inter-correlations existing between the independent variates) tend to be less than the true coefficients derived from the underlying physical law. A regression equation, in fact, gives the best prediction formula, but it does not, under these circumstances, give the best estimates of the true coefficients.

In the case of a single component, x_1 , the equations reduce to

$$b_1 = \frac{u_{11}}{u_{11} + v_{11}} \beta_1$$

This is the equation giving the regression coefficient b_1 which will be obtained by an ordinary regression analysis when the regression on the true values of the independent variate (of which the determination is subject to error) is β_1 .

References.

- Fisher, R. A., "The Statistical Utilization of Multiple Measurements," *Ann. Eugenics*, 1938, VIII, 376-86.
Fairfield Smith, H., "A Discriminant Function for Plant Selection," *Ann. Eugenics*, 1936, VII, 240-50.

WAGE RATES IN THE UNITED KINGDOM IN 1938.

By E. C. RAMSBOTTOM

IN the issues of this *Journal* for 1935 (Part IV) and 1938 (Part I), index numbers were given showing the percentage fluctuations in the level of weekly wage rates in a number of industries during the period 1920-37, the average level of 1924 being taken as = 100. From the particulars as to changes in rates of wages which were reported to the Ministry of Labour during 1938 and published in the *Ministry of Labour Gazette*, index numbers have now been calculated for the end of 1938, and are given, together with those for the end of 1937, in the table below. As the corresponding figures for the end of 1929, which have not hitherto been published, have now become of special interest for purposes of comparison, they are also shown below.

Industry	Index Numbers for end of December (average for whole year 1924 = 100)		
	1929	1937	1938
Agriculture :—			
England and Wales	113	120	124
Scotland	95	97*	103
Mining and Quarrying :—			
Coal Mining	87	97	97
Iron Mining	94	121	137
Other Mining and Quarrying †	102	98	103
Chemical, etc., Industries :—			
Heavy Chemicals	102	104	108
Drugs and Fine Chemicals	102	102	102
Soap and Candles	100	100	104
Seed-crushing and Oil-cake	97	109	109
Paint, Colour, Varnish, etc.	102	107	109
Engineering, Shipbuilding and Metals :—			
Iron and Steel	92	112	118
Engineering ‡	104	113	113
Tinplate	89	101	100
Tube Manufacture	103	118	118
Ship-building and Repairing §	108	121	125
Light Castings	101	110	110
Electric Cable, etc., Manufacture	103	103	103
Brass Wares	102	106	106
Gold, Silver, Electro-plate, etc.	100	119	119
Other Metal Industries || ... ..	101	104	106

* Revised figure.

† Including shale mining and stone quarrying.

‡ Including railway engineering shops.

§ Time-workers.

|| Including heating and domestic engineering; tin box manufacture; stamped and pressed metal wares; spade, fork, etc., manufacture; screw manufacture.

Industry	Index Numbers for end of December (average for whole year 1924 = 100)		
	1929	1937	1938
Textile Industries :—			
Cotton	94	92	92
Woollen and Worsted	99	89	89
Hosiery	95	90	90
Carpets	93	93	93
Jute	104	99	99
Flax, etc.	94	95	95
Lace	100	103	103
Silk	99	94	94
Textile Bleaching, Dyeing, etc.	96	91	90
Clothing, etc., Industries :—			
Tailoring	107	111	111
Dressmaking and Women's Light Clothing	100	107	107
Hat, Cap and Millinery Trades	100	104*	104
Boot and Shoe Manufacture	98	96	99
Laundries	100	112	112
Dyeing and Dry Cleaning	100	95	95
Food, Drink and Tobacco Industries :—			
Flour-milling	102	105	105
Baking	101	100	101
Sugar Confectionery and Food-preserving	100	107	107
Brewing	101	102	102
Aerated Waters	104	103	108
Tobacco	100	100	100
Paper, Printing, etc., Industries :—			
Paper Manufacture	103	98	98
Paper Box Making	97	97	97
Paper Bag Making	96	96	96
Printing and Bookbinding	101	100	100
Building, Contracting, and Allied Industries :—			
Building	101	100	102
Public Works Contracting	99	97	104
Electrical Installation	100	101	103
Cement Manufacture	106	119	119
Brick Manufacture	104	107	107
Electricity, Gas and Local Authority Non-trading Services :—			
Electricity Supply	105	109	110
Gas Supply	104	109	109
Local Authority Non-trading Services	101	104	107
Transport :—			
Railway Service	96	99	99
Tramways	102	111	112
Road Transport (Goods)	99	100	103
Docks	100	108	108
Shipping	95	95	101
Miscellaneous :—			
Coke Ovens	87	105	112
Pottery	102	102	102
Leather Tanning	100	105	105
Leather Goods	100	100	100
Furniture	100	101	101
Coopering	98	103	103
Vehicle Building	102	107	107

* Revised figure.

Index numbers were given, on page 652 of the *Journal* for 1935, showing the percentage fluctuations in the average levels of weekly rates of wages, normal weekly hours of labour, and hourly rates of wages, in all the above industries combined, during the period 1920-34. Two series of index numbers were shown, based (a) on the averages for the year 1924 and (b) on the figures for June 1934, taken as = 100, separate weighting systems being used appropriate to the respective dates. The corresponding index numbers for 1929 (which were not included among those given in the *Journal* for 1935), and for the end of each of the years 1934-8, are given below :—

		Index Numbers for end of December					
		1929	1934	1935	1936	1937	1938
		Base : average of 1924 = 100					
Weekly wage rates	...	98·6	94·4	95·6	98·6	103·1	104·3
Normal weekly hours	...	100·5	100·8	100·7	100·7	100·5	100·4
Hourly wage rates	...	98·1	93·7	94·9	97·9	102·6	103·9
		Base : June, 1934 = 100					
Weekly wage rates	...	105·0	100·4	101·9	104·7	108·9	110·4
Normal weekly hours	...	99·8	100·0	100·0	100·0	99·7	99·6
Hourly wage rates	...	105·2	100·4	101·9	104·7	109·2	110·8

All the foregoing figures should be read in the light of the explanations and qualifications given in the paper (and appendices) relating to "The Course of Wage Rates in the United Kingdom, 1921-34" (*Journal*, 1935, Part IV).

THE STATISTICAL DINNER CLUB

1839-1939

At a meeting of the Council of the Statistical Society on January 11th, 1839, Mr. George R. Porter reported that a Statistical Club had been formed and "had appointed to dine together on the days of the Ordinary Monthly Meetings." That Club has now completed the first hundred years of its life, and the members, in order to mark the occasion, decided that a special Centenary Dinner should be held and that Mr. Macrosty should compile a record of the Club for circulation among the members. That account has now been printed, with "recollections" by prominent members, and though no records exist for the first fifty years, it has been found possible to recover the names of 163 past and present members. The membership is limited to forty and there were in February three vacancies.

The Centenary Dinner was held at the Trocadero after the Ordinary Meeting on February 21st, 1939, under the Chairmanship of the President of the Society, Professor A. L. Bowley. Fifty-one persons took part, namely, twenty-eight members, six Club guests, and seventeen private guests. The member of longest standing, Sir William H. Clark, was absent, being at present resident in South Africa. It was greatly regretted that Mr. Udny Yule, the senior member resident in England, was unable, for reasons of health, to be present, but he composed for the occasion the Canticum, printed below, which was circulated at the Dinner, and also sent a telegram of greeting. In response the gathering sent him a message assuring him of the regret of the company at his absence, their gratitude for his great services to the Society and the Club, and their deep regard for him personally.

After the customary toasts of "The King" and "The Reader of the Paper" had been proposed by the President and duly honoured, Viscount Samuel proposed "The Statistical Dinner Club," to which Sir Percy Ashley (the senior member present) responded. One would gladly have printed these speeches verbatim, but the present reporter must confess that he surrendered himself to the enjoyment of their wit and felicity of phrase and took no notes. Lord Samuel compared the decree of the Founders excluding "opinions" from the debates of the Society with the present freedom of discussion, spoke of the services, never more needed than to-day, of statistics to knowledge, and praised the statistician for his unbiased exposure of facts as against the "garbled" (the pun is not reproducible)

versions imposed in some quarters. Sir Percy, replying, confessed that the Club to-day did not contain "giants" like those—such as Craigie, Bateman, Booth, Baines, Lord George Hamilton, and others—who, when he was elected in 1910, gave the Club meetings a serious and stately character, which was now replaced by a lighter, more convivial disposition, yet still retaining the fundamental seriousness. Mr. Macrosty next proposed the toast of "The Visitors," and Mr. Ashton, replying for the Club's guests, spoke of the close relations always subsisting between the Manchester and the London Societies, told how the Manchester Society had followed the junior institution in forming a Study Group and, more recently, a Dinner Club, and conveyed to his hosts the warmest congratulations and good wishes of both the Society and the Club in Manchester. Dr. R. Hutchison gracefully replied for the other guests, praising the indispensable work done by statisticians for modern medicine. Lastly, Lord Stamp proposed the health of the President, whose fame as a statistician, he said, was world-wide, and the President briefly replied.

The following is a list of those present :—

Members of Dinner Club

Sir Percy Ashley	Mr. R. M. Holland Martin
Mr. M. S. Birkett	Dr. L. Isserlis
Professor A. L. Bowley	Professor J. H. Jones
Lt.-Col. W. Butler	Sir H. A. Lindsay
Mr. A. M. Carr-Saunders	Mr. H. W. Macrosty
Major P. G. Edge	Lord Meston
Mr. B. Ellinger	Professor E. S. Pearson
Mr. G. S. W. Epps	Dr. George Rae
Sir Alfred W. Flux	Dr. E. C. Snow
Professor M. Greenwood	Mr. J. C. Spensley
Sir Harry Haward	Lord Stamp.
Mr. R. G. Hawtrey	Sir S. P. Vivian
Dr. D. Heron	Sir D. R. Wilson
Dr. A. Bradford Hill	Dr. J. Wishart

Guests of the Club

Viscount Samuel	President 1918-20
Mr. T. S. Ashton	President, Manchester Statistical Society
Mr. J. G. Kyd	Registrar-General for Scotland
Mr. H. Leak	Assistant Secretary, Board of Trade
Col. H. J. P. Oakley	President, Institute of Actuaries
Mr. E. C. Ramsbottom	Director of Statistics, Ministry of Labour

Members' Guests

Mr. V. P. T. Derrick	Mr. E. H. Levy
Sir W. Palin Elderton	Mr. W. L. Lloyd-Roberts
Mr. T. H. Gibson	Mr. J. A. Mackerrell
Dr. Harrap	Professor L. Robbins
Mr. P. N. Harvey	Sir Humphrey Rolleston
Professor F. A. von Hayek	Dr. Percy Stocks
Mr. F. R. Hiorns	Sir Henry Tizard
Dr. R. Hutchison	Mr. J. W. Verdier
Sir Wilson Jameson	

CANTICUM IN FESTUM SODALITATIS COENATORIAE E SOCIETATE REGALI
STATISTICORUM NUPER COMPOSITUM

Tria sunt statisticorum gaudia;
Computatio, disputatio, et epulatio.

—*Doctor Hilarius.*

Tria sunt statistico gaudium et gloria,
Machinae mirabiles dictae computoria,
Scripta mathematica ac concertatoria,
Vina electissima quae vendunt diversoria.

Machina pulcherrima fabricata fabro!
Mane te propinquo surridente labro:
Crepitas!—et canto ut puer in lavabro,
Laetus nunc statisticus ut sus in volutabro.

Vere sunt statistici hilari sodales,
Qui perlustrat mundum vix invenit tales,
Si quandoque rixae resonant verbales—
Nonne pugnaverunt ipsi immortales?

Omne autem jurgium moritur in vino,
Gaudeamus igitur munere divino:
Dum in coena bona ridens me reclino,
Felix sum, pacatus, placidus omnino.

Vivant ergo mores Patrum sapientum,
Recte censuerunt coenam post conventum,
Mox confortat Socium post duellum lentum
Et dimittit domum saturum, contentum.

Magna est Societas, gravis et Regalis,
Nostraque Sodalitas haud omnino talis;
Sed securus judicat animus aequalis—
Coenae et conventus, coena principalis.

Chorus.

Regis instar judicat animus aequalis;
Coenae et conventus, coena principalis.

G. U. Y.

REVIEWS OF STATISTICAL AND ECONOMIC BOOKS

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1.—*A Study in Analysis of Stationary Time Series*. By Herman Wold. Uppsala: Almqvist und Wiksell, 1938. 9" × 6". viii + 214 pp. Price kr. 6 (bound kr. 8.)

In a lecture I gave two years ago on the different methods of time series analysis, I divided all the methods applied into two categories, which I called "empirical" and "aprioristic," and remarked that although the empirical approach is much the more common and, at present, the more useful, the future belonged to the aprioristic method.* If we did not apply it at present, it was because we knew too little about the necessary mathematical tools—namely, the branch of the theory of probability dealing with what might be called "random curves" or "random processes." That theory, originated by the Russian mathematicians, Markoff, Khintchine, and Kolmogoroff, was then in an early stage and was to be found only in a rather abstract form in articles in mathematical journals.

This book by Herman Wold fills the need for a publication giving

* J. Neyman: *Lectures and Conferences on Mathematical Statistics*, Washington, D.C., 1937.

the theory in a form adapted to practical applications and it may be warmly recommended to economists and statisticians engaged in the analysis of time series. As stated in the preface, Mr. Wold is a student of H. Cramér, and derived inspiration from the writings of G. U. Yule and A. Khintchine, as well as from the lectures of his immediate teacher. The combination of the names of Yule and Khintchine may seem surprising, for Mr. Yule would not claim to be a pure mathematician, and Mr. Khintchine would never be recognized as a statistician. Yet it appears that they were studying essentially the same things.

The mathematical equivalent of the statistical conception of the time series is the random process. This is defined as follows: Imagine a finite or infinite time interval and denote by t any moment in it. Consider next a random variable $x(t)$ which, in a certain sense, corresponds to the moment t . To each moment t there will correspond some particular random variable $x(t)$. The random variables $x(t')$ and $x(t'')$ corresponding to two different moments t' and t'' need not be independent. We are thus led to consider an infinite system of, in general, mutually dependent variables and their joint probability law. Such a system of variables is just what is called a random process. It may be continuous, if the variable t is allowed to vary continuously, or discrete—if t may have only a denumerable set of equidistant values. An actually observed time series is considered as a set of particular values of the variables $x(t)$.

Mr. Wold limits his considerations to discrete and stationary random processes. Denote by $F(t_1, t_2, \dots, t_n; u_1, u_2, \dots, u_n)$ the probability of the simultaneous fulfilment of the n inequalities $x(t_i) \leq u_i$ for $i = 1, 2, \dots, n$, as determined by the joint probability law of the variables $x(t)$ forming a discrete random process. If this function possesses the property that $F(t_1 + k, t_2 + k, \dots, t_n + k; u_1, u_2, \dots, u_n) = F(t_1, t_2, \dots, t_n; u_1, u_2, \dots, u_n)$, then the random process is called stationary. We may explain this verbally by saying that by a stationary process the probability of various situations at some moments does not depend on the position of those particular moments, but on their mutual distances in time and on what happened before. The process which is not stationary is called evolutive.

The author gives the necessary definitions and a sequence of interesting theorems concerning the discrete stationary processes. Some of these are taken from current literature, but some are new. Various remarkable types of the processes considered are distinguished. The simplest type is, of course, the purely random process by which any variable $x(t')$ is independent of any other $x(t'')$ and all follow the same law of frequency. Next comes the type described as the process of moving averages. If $\eta(t)$ is a random variable belonging to a purely random process, and if for any t the variable $\xi(t)$ is defined by the relation

$$\xi(t) = b_0\eta(t) + b_1\eta(t-1) + \dots + b_n\eta(t-n),$$

then the process composed of the variables $\xi(t_i)$ is called the process

of moving averages. We recognize here a conception previously discussed by Yule, and there are many more similar contacts with the work of Yule in the book.

Having discussed a number of types of random processes, the author furnishes proofs of their various properties, and then gives a theorem of considerable interest, concerning the structure of the most general discrete stationary process. This, in fact, can always be presented as a sum of two components the nature of which is known. When dealing with stationary processes, the author discusses what he calls stochastic difference equations, and proves some of their fundamental properties. All this is done in Chapters II and III. Chapter I is given to a review of some of the current methods of time series analysis. The fourth and last chapter will be the most interesting to a non-mathematical reader, for it contains the applications of the theory to a number of actual time series. The first example is the series of yearly wheat prices in Western Europe, 1518-1869, compiled by Sir William Beveridge. Next come two correlated time series of (i) the level of Lake Vaner and (ii) the rainfall. Finally, there is a detailed discussion of a series representing the cost-of-living index in Sweden. Besides those examples, the discussions of which amount almost to separate studies, the author refers frequently to various time series previously discussed by Mr. Yule, Sir G. Walker and others. The book ends with two appendices on the Cramér-Mises ω^2 test for goodness of fit, and—a very interesting one—on the numerical significance of correlation coefficients.

It seems probable that the publication of Mr. Wold's book, which is, so far as I know, the first of its kind, will considerably influence the development of the time series analysis, but still some of the most important problems involved remain unsolved and, as the author says himself, at present it is difficult to see how to attack them. He describes them as sampling problems, but really they are problems of testing hypotheses and of estimation. Given a time series and a hypothetical probabilistical model, M_0 , represented by a random process, shall we agree that the model M_0 does represent the machinery which produced the time series, or shall we reject the model M_0 and look for another? This is the kind of question we must learn how to answer. The general method of attacking it seems to be that common to all problems of testing hypotheses. If we expect that the original model may be wrong, we must be clear about the ways in which it may be wrong. This will involve a definition not of one single random process M_0 , but of the whole family of them, that may be denoted by (M) . If a time series consists of n figures, then it can be represented by just one point, E , in a space W of n dimensions and, whatever be a region w in that space, each of the models M will define a probability that the point E will fall within w . The process of looking for a criterion appropriate to test the hypothesis that M_0 adequately represents the actual machinery behind the time-series considered, is equivalent to a search of a certain region w_0 in the space W such that, (i) whenever M_0 is true the point E is unlikely to be found in w_0 and (ii)

whenever M_0 is not an adequate model of the phenomena considered, then the chance of E being found in w_0 is as great as possible. We see that the questions to solve do involve the problems of sampling. The amount of such problems seems to be even greater than is suggested by the author. But there is something beyond those problems, that of choosing a proper criterion. In view of the author's manifest skill, we may confidently hope that some of these problems will be found solved in future editions of Mr. Wold's very interesting book.

J. N.

2.—*Statistical Methods for Research Workers*. By R. A. Fisher. 7th edition. Edinburgh: Oliver and Boyd, 1938. $8\frac{3}{4}'' \times 5\frac{1}{2}''$. xv + 356 pp. 15s.

In the seventh edition of this now classical work the author follows his previous practice of adding new sections on methods that have recently been evolved. In this edition a most valuable note has been added on the discrimination of groups by means of multiple measurements. The statistical technique of the analysis of multiple measurements has recently received considerable attention from a number of quarters, and the utility and wide application of discriminant functions in making possible the exact treatment of previously insoluble problems are now recognized.

The section on orthogonal polynomials has also been expanded so as to give a fuller introduction to their theory, by way of orthogonal comparisons between observations, a revision which is made more valuable by the fact that tables of the polynomial coefficients are now available in *Statistical Tables*.

F. Y.

3.—*Statistical Tables for Biological, Agricultural and Medical Research*. By R. A. Fisher and F. Yates. London: Oliver and Boyd, 1938. $11\frac{1}{4}'' \times 8\frac{1}{2}''$. 90 pp. 12s. 6d.

There are thirty-four tables in this book, and it is only necessary to enumerate them to give an idea of their value. The first seven are tables of significance points of the normal distribution and associated sampling distributions, t , χ^2 , z and the correlation coefficient, and will be familiar to readers of Professor Fisher's *Statistical Methods*. Then come tables for testing significance 2×2 contingency tables, and tables of profits and angular transformations. These are followed by tables of Latin squares and associated quantities; of scores for ranked data; and of orthogonal polynomials. The set concludes with some of the material commonly required in statistical work, logarithms, natural logarithms, squares, reciprocals, sines, tangents, random numbers, and a very useful table of constants, weights and measures which is far superior to the usual perfunctory table with which volumes of this kind generally conclude.

For once a reviewer can use a stock phrase without exaggeration. The book will be indispensable to users of the newer methods in statistics.

M. G. K.

4.—*Tables for Calculating by Machine Logarithms to 13 Places of Decimals*. By Frédéric Deprez. Berne: A. Francke, Ltd., 1939. $9\frac{3}{4}" \times 6\frac{3}{4}"$. xv + 166 pp. 25 Swiss francs.

Tables of Addition and Subtraction Logarithms. By B. Cohn. London: Scientific Computing Service, Ltd., 1939. $9\frac{1}{2}" \times 6"$. viii + 63 pp. 10s.

Tables of logarithms are almost as numerous as dictionaries, and may be classified in much the same way. There are those for general day-to-day use; the massive works of reference which one would like to have, but can only afford to give to friends; and the specialist works for use in particular subjects.

Here are two specialists. M. Deprez' tables are an ingeniously constructed set from which 13 place logarithms or antilogarithms can be rapidly obtained by the use of a machine. There are four of them, giving respectively the antilogarithms of mantissas from 0.001 to 0.9999, from 0.0000 001 to 0.0000 999, from 0.0000 0000 01 to 0.0000 0009 99, and from 0.0000 0000 0000 1 to 0.0000 0000 0099 9. To find the antilogarithm of a 13-place figure we split it into the sum of four logarithms containing the first four places of the original, the 5th, 6th and 7th places (the first four being zeros) and so on; read off the antilogarithms of these four parts from the tables; and then multiply the four resulting figures on the machine. Logarithms proceed by successive division. The tables are particularly useful in actuarial work (for which two additional tables are provided), but seem capable of considerable application in certain branches of statistical computation, such as the ascertainment of the ordinates of certain Pearson curves and some quadrature problems.

The late Dr. Cohn's tables were constructed for the purpose of finding $\log(a + b)$ and $\log(a - b)$ from $\log a$ and $\log b$ without going back into antilogarithms. For example, if

$$\log a - \log b = D$$

and

$$\log(a + b) - \log a = A$$

the tables give the values of A against D as argument. D is ascertainable from the data, A is then found from the tables and $\log(a + b)$ found by addition to $\log a$. Similar tables are given for $\log(a - b)$. The original German edition of these tables is now out of print and thanks are due to Dr. Comrie, of Scientific Computing Services, for issuing this English reproduction.

M. G. K.

5.—*Duodecimal Arithmetic*. By George S. Terry. London: Longmans, 1938. $12" \times 9\frac{1}{2}"$. 407 pp. 30s.

The scale of 10, though almost universal, is not a very good one. In particular it is inferior to the scale of 12. Indeed, that the number of digits on the human hand is not a multiple of two or three must be classed among Nature's major anatomical oversights.

Mr. Terry believes so strongly in the advantages of a duodenary scale that he has converted a large number of existing denary tables into it, with the aid of two new symbols for ten and eleven. The

labour involved in the preparation of this book must have been enormous, for it includes not only multiplication and factor tables, but logarithms, trigonometrical functions, sine and cosine integrals, digamma functions, Bessel functions, and Everett interpolation coefficients.

The advantages of duodecimal arithmetic are at their minimum in the use of tables of standard mathematical functions, for an irrational number does not terminate in the scale of 12 any more than in the scale of 10. But one of the practical arguments advanced against the introduction of the duodenary scale is that it would involve too much dislocation and too wholesale a scrapping of existing tables. Presumably Mr. Terry has sought to anticipate this criticism by providing the necessary substitutes. One must admire his courage in pursuit of an ideal, but one fears that he is doomed to disappointment. Nothing short of spiritual rebirth would make the world learn another set of multiplication tables. M. G. K.

6.—*The Synthetic Optimum of Population*. By Imre Ferenczi. Paris: International Institute of Intellectual Co-operation, 1938. $9\frac{1}{2}'' \times 6''$. 115 pp.

This monograph has been written at the request of the International Studies Conference and published by the International Institute of Intellectual Co-operation. It provides an adequate and stimulating review of the various opinions which are held on this contentious subject. It suffers, perhaps inevitably, the usual defects of monographs of this type, there being little in the way of concrete conclusions or adequate discussion of the rival views.

The author begins by studying the actual densities of population in the various countries of the world. The extreme variation of these figures is sufficient to show that mere density per unit area is entirely useless as an index of over- or under-population. He endeavours to pursue the enquiry further by considering "productive" and "agricultural" land. Such discussion, however, leads to nothing very definite, owing to the lack of trustworthy and comparable information. What, for instance, is one to make of the statement (p. 29):—

"It may be stated more generally that, because of the difference in the agricultural density *and* in the productivity of the soil, the standard of living (or purchasing power) of the peasant population of Eastern Europe and the Balkans certainly does not reach one-fifth or one-sixth of that of Western and Central Europe, especially in view of the fact that the prices of manufactured goods are likewise higher in the former countries."

Taken at its face value, this would imply that the wages of our agricultural workers could be reduced to one-fifth their present amount and still remain above subsistence level, for the peasants of Eastern Europe undoubtedly subsist.

Conclusions from the actual situations existing in the different countries are, therefore, impossible, both because very few countries

form closed economic systems, and because the relevant information is hopelessly lacking.

The possibility of treating the population question as an international problem on a world-wide scale must likewise, as the author himself recognizes, be regarded as impractical at the present time. Idealistically this may be regarded as a disadvantage, but it should be realized that there are advantages in the parallel development of a number of more or less self-contained communities, both on the economic and biological side. On the economic side the losses which may theoretically arise owing to the existence of smaller units may be more than compensated for by the greater efficiency of organization, and the stimulation provided by other communities. Biologically the existence of a number of communities is at least some insurance against disasters resulting from misguided eugenic policies, or from lack of any policy. A healthy rivalry between communities undoubtedly provides a stimulus towards the introduction of effective eugenic measures, as well as a testing-ground on which their value may be judged. The discussion by the author of the tentative efforts that are now being made towards a better eugenic policy, and the various theories that are now current, is particularly apposite in this respect.

F. Y.

7.—*Medical and Sanitary Reports from British Colonies, Protectorates and Dependencies for the Year 1936.* Summarized by P. Granville Edge. 296 pp. (Supplement to vol. 35 of Tropical Diseases Bulletin, 1938. S.O.)

Most Englishmen talk about the "Empire," and the genius of Rudyard Kipling brought the glamour and romance of administration in distant climes home to the dullest imaginations of "gentlemen in England now a-bed." But Kipling is gone, and has left no successor of his mettle. Annals which a poet might infuse with emotion are docketed by clerks in Whitehall; once in a while a parliamentary question or some grinding of political axes may raise a flicker of interest, but that is all.

For some years, both as a teacher of those who will work in tropical countries and a collaborator with the staff of the Bureau of Hygiene and Tropical Diseases, Major P. Granville Edge has striven to arouse interest in the vital-statistical and epidemiological problems of the colonial empire, and has enriched the proceedings of our Society with accounts of some of his work. The volume before us is prefaced by a careful study of the incidence and distribution of human Trypanosomiasis in British Tropical Africa which should receive close attention. The author makes the point that heavily stricken tracts of country are separated by areas almost free from the disease, although the tsetse-fly is present. Nobody supposes that such an epidemiological problem can be solved wholly by statistical analysis; the close co-operation of naturalists, pathologists, and clinicians is needed. But Major Edge is the first statistician to bring together the relevant data, and we hope will be rewarded by the practical interest of those of his colleagues and

pupils who are in a position to study the problem in the field. The bulk of the volume consists of succinct analyses, enlivened by pungent occasional notes, of medical and sanitary reports from colonies. Some of these can be read with satisfaction, even with pride, others with very different feelings. As the state of affairs in St. Helena is now under discussion in *The Times*, it is possible something may be done. But we are now entering on the year 1939, and the island report for 1936 spoke of housing conditions as "appalling" and the Lunatic Asylum as "a lamentable institution" controlled by untrained persons. Passing to the West Indies, we read that in the island of Dominica a nutrition survey of children attending Government Elementary Schools revealed 32.4 per cent. to be 10 per cent. or more below standard weight, and that the average diet of the labouring classes was deficient. The death-rate of Dominica was, however, lower for the year than that of Montserrat, another member of the Leeward group, 13.7 per 1,000, against 14.9. In Montserrat bad weather led to a failure of the island's chief crop (Sea Island cotton); "as a direct consequence much privation was experienced among the labouring classes and the general health of the population suffered." Next to the account of Montserrat is that of St. Kitts, Nevis, and Anguilla. These three islands are said to have birth-rates per 1,000 of 44.4, 23.6, and 24.8 respectively, and death-rates of 33.2, 14.5, and 15.4. St. Kitts has a gloomy pre-eminence, and one is tempted to enquire why it did so much worse than famine-stricken Montserrat, which with almost as high a recorded birth-rate, 39.3, had less than half the St. Kitts death-rate.

It would be easy to go on like this: to call attention to singularities, perhaps to yield to the temptation to find fault. Neither space nor good sense permits this. To the reviewer the words Dominica, Montserrat, and St. Kitts do not bring up any much clearer picture than those of the islands which Aeneas visited in the Mediterranean, sometimes with unfortunate epidemiological results (see *Aeneid* III, 135 *et seq.*). That this ignorance is widespread is probably one of the reasons why there are great contrasts. But the ignorant cannot usefully criticize. We can, however, set about acquiring some more knowledge of—say—the Leeward Islands, and in time there may be a serious public opinion on Colonial Office questions.

M. G.

8.—*Introduction to Economic Statistics*. By W. L. Crum, A. C. Patton, and A. R. Tebbutt. London: McGraw-Hill Publishing Co., 1938. 9" x 6". xi + 423 pp. 24s. net.

This book, by authors who are respectively Professor of Economics at Harvard University, Associate Actuary of the Massachusetts Protective Life Assurance Company, and Assistant Professor of Economics at Brown University, is really a survey of statistical methods which might be useful to persons engaged in the handling of statistical data. The authors are careful to warn their readers of the dangers of using statistical data about whose origin they

know little or nothing, and considerable attention is devoted to the question of a critical examination of the data used, the sources from which they are derived, and the methods of obtaining the original facts. This aspect of statistical methods, to which little care is given as a rule in such books as the present, is very important. A person, who is the ultimate origin from which a statistical unit in a table is obtained, may not have any notion that the information for which he is responsible is later to serve a purpose in an important investigation. He may fill up a questionnaire with statements which are untrue, through ignorance or malice. He may be conducting a survey, but decide to conduct it in an arm-chair rather than in the field. All original information should be checked.

Further, many investigators perforce have recourse to data collected at some time previous to their investigation, and the problem may arise whether the terms used at the time of the collection of the original data bear exactly the same meaning as that in the mind of the present investigator. In such a case a person hopeful of solving a particular problem may find the material which he thought would be helpful to be useless owing to inconsistency of definition of technical terms.

Further, data respecting the same matters may be collected by different agencies, and the resulting tables may be conflicting. Especially is this the case when international comparisons are wanted. One may find discrepancies between the recorded trade between two countries when the relevant statistical data of each are compared. It is probably correct to state that the most important branch of statistics is the method of collecting data—far more important than the various arithmetical dodges which people invent in order to reduce labour of computation, more important than questions as to whether the arithmetic average or the median or the mode or the geometric average should be used. Incidentally, is the harmonic mean anything but an algebraical curiosity?

So it is all to the good that the authors discuss the validity of the data at greater length than is usual in such books. Although the book is intended as an introduction to statistical methods, one must conclude that the reader is expected to have some knowledge of the subject already, or else he will ask awkward questions here and there. For instance, on p. 176, when the authors tackle the problem of finding the mean weekly earnings of a group of machine book-keepers, the data consisting of grouped frequencies, the reader may ask why the assumption is made that "the mean of all the variables falling within the given class interval is exactly at the centre of the interval," if the teacher introduces the reader to original data which can be examined in detail in the groups. There is, in fact, no need to make the assumption. It is rather a working rule which follows from a more general assumption (Sheppard).

One suspects that confusion may ensue, except to the knowing ones, when a diagram where frequencies are represented by areas is superimposed on a diagram where frequencies are represented by lengths. In a footnote on p. 209, in a brief description of the normal curve, the authors refer to the ordinate (frequency) for any point

of this curve. The knowing ones realize, of course, that the frequency for any point of the abscissa is precisely nothing, but the ordinate is not nothing. It would be better if the old frequency polygon had never been invented, or, perhaps that nature somehow should constrain all frequency tables to have group intervals of the same extent. But a student far removed from personal contacts with a teacher is bewildered when he finds that in real life the length of the interval alters. If he always represents such frequency tables by using area to correspond to frequency, his troubles never start.

Perhaps it is a pity that the authors, on p. 306, when they are discussing the fitting of a straight line to a certain time series, say, "The fact that the trend line is the line of regression on time." The curious student will probably want to work out the regression line of time on production. It is probably best to keep separate the idea of fitting a curve to a time series from the idea of two variables being correlated. Perhaps some of the confusion which arises later, when persons start with the assumption that two variables are correlated and finish by discovering the formal algebraical equation which connects them, is due to the mingling of the two ideas in text-books.

The book is well produced and profusely illustrated with examples throughout. In addition to averages, frequency groups, correlation, and secular trend, it also deals with index numbers, seasonal and cyclical variations, and charting of all kinds.

E. C. R.

9.—*Oxford Economic Papers*, Number I, October, 1938. Oxford: Clarendon Press, 1938. $9\frac{1}{2}'' \times 6\frac{1}{2}''$. 123 pp. 3s. 6d.

This is the first number of a serial publication, intended primarily as a channel for communicating the results of research work in economics carried on in the University of Oxford, and it will undoubtedly be welcomed by economists elsewhere. The five papers contained in the first number extend over a wide range.

Mr. A. J. Brown's investigation of the Liquidity Preference Schedules of the London Clearing Bankers should perhaps be classed as an exercise in statistical method. Based on extremely simplified assumptions as to the motives guiding the banks, and on the expression of those motives through artificially devised algebraical equations, his calculations could hardly be expected to reach results with much bearing on practical life. Within its necessary limits the study is acute and ingenious. Perhaps it is a misfortune, but at any rate it is a hard fact, that human nature does not engender algebraic functions.

The Index of Real Turnover, 1919-36, by Messrs. E. H. Phelps Brown and G. L. Shackle, proceeds on the assumption that "the total of Metropolitan, Country, and Provincial clearings may be regarded, with certain reservations, as an index of the total flow of cheque-payments in the non-financial circulation of the United Kingdom." The non-financial circulation, so far as it is composed of payments for goods and services, can be converted into "real turnover" by being divided by a price index

number. Much care and ingenuity have been devoted to the construction of an appropriate index number, but the materials available are not really adequate for the purpose, and surely it is a mistake to treat as "non-deflatable" such items as profits and interest, when salaries are deflated on the basis of cost of living. If salaries are valued not in terms of the service for which they are paid, but in terms of cost of living, why should not other sources of income be similarly treated?

The whole calculation is seriously vitiated by the fact (fully recognized by the authors) that the Metropolitan, Country, and Provincial clearings do contain a considerable admixture of "financial" transactions. But in any case it is open to question whether such a calculation (which has evidently involved a prodigious amount of highly skilled work) was ever worth making. The results, even if they had been of unimpeachable accuracy and reliability, would yet have had very slight theoretical interest. They were presumably intended to illustrate that form of the quantity theory of money which depends on the "equation of exchange," itself of very dubious theoretical value.

A statistical investigation into the mobility of labour by Messrs. H. Makower, J. Marschak, and H. W. Robinson is based on statistics of unemployment insurance at Oxford. It throws new light on a matter of considerable importance in economics, and points the way to further investigations that ought to prove fruitful.

The other two articles are concerned with the rate of interest, and are to be read together. That on the significance of the Rate of Interest, by Mr. H. D. Henderson, introduces a Summary of Replies to Questions on Effects of Interest Rates by Mr. J. E. Meade and Mr. P. W. S. Andrews.

Mr. Henderson's article is sceptical in tendency. "If the question is put, 'What is the *modus operandi* by which low interest rates stimulate activity?', there are few," he thinks, "who are ready to offer a coherent answer," and he throws doubt first on the power of the rate of interest to induce manufacturers or traders to purchase additional stocks of materials, and then on its influence on long-term capital expenditure.

With regard to the former, he contents himself with saying that "by increasing his stocks in excess of his requirements the manufacturer or trader will incur an unnecessary expense," as if the "requirements" were a fixed minimum, and the normal practice of the trader were to maintain this minimum by continuous purchases exactly corresponding to his sales. Whenever a trader decides to buy several weeks' or months' supply of anything instead of daily dribbles, he is incurring "an unnecessary expense," because the saving in trouble makes it worth while. If the unnecessary expense is increased, he may revise his practice.

As to long-term investment, Mr. Henderson quite rightly points out that, when account is taken of the relatively short life of industrial plant (especially owing to the chance of obsolescence), the rate of interest forms quite a small proportion of the total cost. But when he contrasts industrial plant with houses and public utilities,

he somewhat exaggerates the difference between them. Depreciation is likely to be as important for the plant of public utilities as for that of industrial concerns, and even for dwelling-houses a substantial allowance has to be made for obsolescence.

Mr. Henderson's article serves as an introduction to that of Messrs. Meade and Andrews. "A number of leading business men," writes Mr. Henderson, "representative of different branches of industry, commerce and finance, have been closely questioned by us as to the way in which, as they see it, their activities are affected" by changes in the rate of interest.

A questionnaire was prepared. Mr. Henderson does not contemplate the possibility of stocks of any goods except "materials" being affected, and the questionnaire is more explicit in that it excludes any stocks except of "raw" materials. The authors of the questionnaire seem to have been thinking only of producers, to the exclusion of dealers in commodities, who would buy goods other than materials.

In their selection of business men to answer the questionnaire, however, they did include, along with twenty-seven engaged in production and five in transport and finance, four dealing in commodities, two of whom were retailers and two merchants. "The information extracted" does not take the form of answers to the questionnaire, but is arranged under a different set of headings, one of which is "the effect of short-term interest rates and of the banks' lending policy on investment in fixed plant or in stocks." The limitation to stocks of "raw materials" was thus dropped.

Surely, if the effect of the short-term rate of interest on the purchase of goods by traders for stock was intended to form a serious part of the investigation, the limitation of the dealers in commodities to four out of thirty-six was singularly ill-judged. It is not surprising to find that only a few of the *manufacturers* questioned admitted any effect of the kind. Both stocks and temporary borrowing play a much less prominent part in the business of a manufacturer than in that of a dealer in commodities. The whole extent of the information extracted from the retailers on the subject was the following :—

First retailer—"Normal changes in the bank rate would not affect size of overdraft or policy in matters of expansion."

Second retailer—"Have not increased stocks because of a fall in interest rates."

No hint is given as to what changes in bank rate are to be regarded as "normal" or whether "policy in matters of expansion" means an increase in stocks or an expansion of business. And it would have been interesting to ascertain whether the second retailer would *reduce* stocks in the event of a *rise* in interest rates.

The merchants were not quite so oracular. They refer to the psychological effect of bank rate, and, as to the direct effect, one says that "a fall in the bank rate can be only a mild stimulant," the other that "a change of from, say, 2 to 6 per cent. in bank rate might be important, but normal changes have a very small effect."

The "summary of replies" at the end does not give quite an accurate impression of their purport. To the "almost universal agree-

ment that short-term rates of interest do not directly affect investment in stocks or in fixed capital" there are stated to be only three exceptions. But these three exceptions do not include the cases where bank rates are said to be "not very important," or to "affect stocks very little," or to be "too small a factor in comparison with other costs to be themselves decisive in any case." These, like the retailers' answers, are regarded as simple negatives. Messrs. Meade and Andrews do not seem to appreciate the importance even of a very *slight* pressure applied over the whole range of traders' purchases. What seems very unimportant to the traders who delay or hasten their purchases, may make a great difference to the producers who depend on orders from them. A trader who estimates six weeks' sales of a certain article at 700 to 800 units would think a decision to order 700 rather than 800 very unimportant, but it would not be unimportant to the manufacturer.

The replies in regard to the effect of long-term interest rates on investment in fixed plant were very similar to those in regard to the effect of short-term interest rates, but the summary here proceeds: "We have evidence, then, that in ordinary manufacturing business the long-term rate of interest is of some, though very limited, direct importance in affecting investment." We are reminded of the King of Hearts going on to himself in an undertone, as if he were trying which word sounded best, "important—unimportant, unimportant—important—of some, though very limited, direct importance."

R. G. H.

10.—*Value and Capital: an Inquiry into some Fundamental Principles of Economic Theory.* By J. R. Hicks. Oxford: Clarendon Press, 1939. 8 $\frac{3}{4}$ " \times 5 $\frac{1}{2}$ ". xi + 331 pp. 12s. 6d.

Professor Hicks's claim to have adopted a new method of analysis is well founded. His book is a remarkable piece of pioneer work.

Parts I and II of the book deal with the conditions of equilibrium of a static system. An analysis noteworthy for elegance and lucidity shows how the indifference curve devised by Edgeworth and Pareto can be employed to evolve a complete mathematical theory of demand, without assuming a quantitatively measurable "utility." Utility, as a mere abstraction from the consumer's preferences, being eliminated, the conditions of stability can no longer be stated in the form of maximum utility. Professor Hicks introduces the "marginal rate of substitution" of one commodity for another, the quantity of one which would just compensate the consumer for the loss of a marginal unit of the other.

The general equilibrium of Walras and Pareto implies that the state of supply and demand of any one commodity in an economic system may have repercussions on some or all of the others. Professor Hicks expresses these repercussions in terms of two relations, complementarity and substitutability. (Heaven save us from the cacophonous neologism, "complementarity," which he uses.) The underlying idea would seem to be that two commodities are complementary when the increased use of either induces an increased

demand for the other, and are substitutable when the increased use of either induces a decreased demand for the other.

The criterion of stability is properly to be found in the behaviour of a system when all demand functions and supply functions are given, and one or more *prices* are displaced from the equilibrium position. At times Professor Hicks follows this procedure. But for his definitions of complements and substitutes (p. 44) he assumes a change in the supply of one of the commodities. And eventually, when he comes to generalize the conditions of equilibrium of a static system (p. 105), he postulates changes both in demand and in supply. That is to say, instead of formulating the conditions of stability of a given equilibrium position, he passes to the consideration of the equilibrium of a different system. Perhaps the analysis is not very different, but there results a sad lapse from his usually high standard of lucidity.

"The normal relation between a factor and its product," we are told, "is to be regarded as a relation of substitution" (p. 105). And it is true that factor and product react in the same direction to any change in demand, or to any change in the price of the factor. But a change in the price of the product causes an *opposite* change in the price of the factor. A fall in the price of the product means an increased use of it, and an *increased* demand for the factor.

In the course of his analysis, Professor Hicks is confronted with the fundamental difficulty of reconciling the analysis which equates price to marginal cost with the existence of profit. That analysis does not ensure that the surplus which constitutes the remuneration of the entrepreneur must be a positive quantity. The theory of imperfect competition does not satisfy him. "Under monopoly the stability conditions become indeterminate." "It is, I believe," he says, "only possible to save anything from this wreck—and it must be remembered that the threatened wreckage is that of the greater part of economic theory—if we can assume that the markets . . . do not differ very greatly from perfectly competitive markets." We may suppose "that the percentages by which prices exceed marginal costs are neither very large nor very variable" (p. 84). "This get-away," we are told, "seems well worth trying." Professor Hicks does not seem to have considered the alternative of supposing that traders look not merely for a positive surplus, but for a normal and adequate percentage of profit.

The admission of profit into marginal analysis, grudging though it is, is a new departure, and one to be commended. Even so might a group of grammarians who had consistently ignored the existence of the verb, and were at last compelled to recognize it, have deplored "the threatened wreckage of the greater part of grammatical theory."

It is a matter for regret that, after this twinge of misgiving, Professor Hicks forgets to take account of profit, even of a percentage "neither very large nor very variable," in his subsequent reasoning.

In Parts III and IV, Professor Hicks turns to "Dynamic Economics." His method, however, amounts to little more than a glorified statics. He posits a series of equilibrium positions at short intervals (called "weeks," though they are not necessarily actual weeks), and

the admixture of dynamics consists in the inclusion of forecasts of prices and of rates of interest in the motives determining equilibrium. The essentials of a dynamic system, the investigation of a state of *disequilibrium*, and the relative rates of progress of the corrective tendencies set up, he hardly touches on.

In this portion of the book, however, he continues to show a mastery of analytical method, and a high degree of originality. But the value of his conclusions is diminished by a very unreal hypothetical background.

Traders and consumers are assumed to regulate their actions by forecasts of input, output, prices, and rates of interest. By an ingenious and original analytical device, the outputs at different future times are treated as different outputs or joint products, and the inputs at different times as different inputs or co-operating factors, and so the relations of complementariness and substitutability become applicable. When equilibrium is disturbed—for example, by a change in a price or a rate of interest embodied in these forecasts—stability is maintained principally by “substitution over time.” Inputs and outputs can be postponed or hastened.

Now the period within which the market forecasts prices is in practice limited to that within which estimates of supply are practicable. That is substantially Marshall’s “short period,” within which supply consists of existing stocks plus the output of existing capacity (p. 121).

“Substitution over time is here intimately related to “the device of forward trading, including not only dealings in forward markets, commonly so called, but also all orders given in advance and all long-term contracts” (p. 135). The effect of substitution over time is to link together future prices and spot prices so closely, that forecasts of prices have very little significance except in the special case where an existing shortage is believed to be temporary, and, failing adequate stocks to meet the existing demand, a forward sale for a date when increased supplies will be available does forecast a fall of price. Professor Hicks, in treating this exceptional situation as “normal” (p. 138), has misinterpreted a passage in Mr. Keynes’s *Treatise on Money* relating to “normal backwardation.”

Professor Hicks argues that, as the traders who resort to the forward market for hedging are predominantly sellers, the corresponding forward buying must devolve on speculators. He has forgotten the dealers in commodities, the retailers, wholesalers and merchants, who give forward orders to producers to make good the reductions in their stocks arising through sales. The main body of traders, in fact, can usually conduct their business on the basis of current demand without making any forecasts at all, and the forecasts that they do make are primarily of demand, not of price. Loosely attached to this phalanx of traders, there are, it is true, scouting and reconnoitring parties of speculators, whose interest is centred on prices (especially of primary products which are subject to big price fluctuations). But to treat prices as the principal subject-matter of traders’ expectations, is to give quite a false picture of their state of mind.

Professor Hicks makes use of the concept of “elasticity of

expectations," the ratio of the proportional rise in expected future prices of anything to the proportional rise in its current price. He applies it only to those expectations which arise *merely* from current price movements, to the exclusion of those based on assignable economic or extraneous causes. But so long as current and forward prices are linked together by the state of supply, there is no room for "elasticity of expectations" to operate at all. There may nevertheless be room for an elasticity of expectations of *demand*; a trader may interpret an increase or decrease in current demand either as a temporary vagary to be soon corrected by a contrary movement, or as the presage of a permanent or progressive increase or decrease in the future. If many traders act on similar expectations, the effect is felt in output and possibly also in prices, both spot and forward.

But surely it is quite impossible to *aggregate* the traders' expectations, whether of demand or of prices, into a total. The fact that a market may be disturbed by a speculative exaggeration of a price movement in this way, is familiar enough. No further light is thrown on it by seeking for a numerical measure of the tendency.

It is only for the short period, within which supplies depend on existing stocks and productive capacity, that expected prices are linked by the market to current prices. And forecasts extending much farther into the future cannot be altogether excluded from the traders' purview. A trader who launches an enterprise equipped with fixed capital is making assumptions about the future; even though his immediate motive is simply to meet an existing demand, a belief that the demand will continue for a long time to come, may be said to be implicit in his actions. But that does not mean that he makes a detailed forecast of demand or of prices, any more than a man who starts farming makes a detailed forecast of the weather.

Professor Hicks, however, builds up his theory of interest on the existence of detailed forecasts. He supposes every trader to have a plan of future operations and to discount his input and output at any future time at the appropriate rate of interest. He points out that the long-term rate of interest can in theory be analysed into a series of short-term rates for successive short intervals, and that, when rates are quoted for different maturities extending far into the future, short-term or medium-term rates can be inferred for the intervals from any maturity to any other. Equipped with these (hypothetical) data, he constructs a theory of interest of such unbounded generality, that other theories such as that of Boehm-Bawerk, are no more than special cases of very limited application (p. 219).

And no doubt, *if traders did make plans of this kind*, estimating separately their input and output, and prices and rates of interest for every week for a thousand weeks ahead, their calculations ought to be on Professor Hicks's lines. But in the world as it is, the assumptions of Marshall and Boehm-Bawerk are much nearer the facts.

Professor Hicks, in the course of his analysis, offers a formula of his own in place of Boehm-Bawerk's "period of production." The formula is arrived at as the "elasticity" of the present value of a series of payments with respect to the discount ratio. Tripping up

for once on a point of mathematics, he imagines that this elasticity formula can be "a length of time" (p. 187), and that, if the "payments" be taken to mean the surpluses of outputs over inputs, it can be made to play the part of the period of production.

He is aware that the formula is faulty, in that it depends on the choice of an arbitrary rate of interest (p. 223), but is not deterred from proving that, like the period of production, it tends to increase when the rate of interest falls or to decrease when the rate rises.

He has been too easily persuaded by adverse critics of Boehm-Bawerk's period of production. In other respects his theory of interest is indistinguishable from those which equate the rate of interest on the one side to marginal yield, and, on the other, to the consumer's marginal time preference. He ventures, it is true, on the surprising proposition, that the rate of interest is payment for "the trouble involved in investing funds", and turning investments back into money (pp. 164-5), but this does not seem to make his theory of the actual determination of the rate materially different from, say, that of Professor Irving Fisher.

The case on which Professor Hicks's dynamic analysis eventually concentrates, is that where elasticities of expectations of price changes are greater than unity—that is to say, where any rise or fall of prices evokes an expectation of a further rise or fall. When elasticities of expectation are equal to unity, prices, after any change, being expected neither to go further nor to react, but to stay where they are, we have a limiting case. "Even when elasticities of expectations are equal to unity, the system is liable to break down at the slightest disturbance." "The proposition which we have thus established," he goes on, "is perhaps the most important proposition in economic dynamics" (p. 255).

He is here dealing with a change, not in the price of one commodity, but in the price level of commodities in general. When a rise in the price level is interpreted as portending a further rise, that is usually the consequence of the monetary situation. People foresee that an increased supply of money will soon bring about a price level higher than the existing supply of money can support. The position is similar to that of an anticipated abundance of a commodity when the existing stocks are not sufficient to permit of an immediate reduction of price.

The natural corrective would be a restriction on the creation of money, whereby people's expectation of an abundance of money could be dispelled. Unfortunately, Professor Hicks's account of the manner in which the supply of money is determined is extremely obscure and confused. Whenever he touches on money, his powers of analysis seem to weaken and fail.

On page 158 we are told that net expenditure by private persons = net output by traders. Yet we find over and over again that movements in prices or in the rate of interest make these *equal* quantities move in opposite directions (pp. 232, 251, 276, 277).

The effects of price movements and of the rate of interest are worked out in terms of input and output. But no special consideration is given to the case of the banker who has neither output nor

input. The fact that the banker creates money in exchange for securities is hardly even alluded to. Chapter XXII, which is devoted to the laws of the working of the temporary equilibrium of a whole system, deals with the reactions of "commodities," "securities," and "money." Securities include every income-yielding pecuniary asset, from irredeemable debentures to day-to-day money, and even include current accounts when they yield interest. Whether shares are commodities or money, we are not told. If the characters in Tolstoy's *War and Peace* were labelled "good," "bad," and "comic," the classification would hardly have been more inadequate.

R. G. H.

11.—*Reinvestment Cycles and their Manifestation in the Norwegian Shipping Industry*. By Johan Einarsen. Publication No. 14 of the University Institute of Economics. Oslo, 1938. 9½" × 7". 222 pp.

After an introduction in which the author stresses the necessity of combining theoretical and empirical studies in attacking the problems of economics, this book (which was written between 1932 and 1935) falls naturally into three parts. The first contains a review of the previous treatment of reinvestment and its bearing on trade fluctuations, and in particular examines the theories of Marx, Tugan-Baranowski, Spiethoff, Aftalion, Robertson, Pigou and Schönheyder. Next follows Dr. Einarsen's own contribution to the subject, and the final section contains an empirical study of the Norwegian shipping industry from 1883 to 1932 designed to illustrate his thesis.

In the theoretical section reinvestment cycles are divided into two categories—pure and secondary. The first result from the fact that a burst of investment in one period will give rise to an "echo phenomenon" some years later when the assets wear out. The second class arises when reinvestment is done, as it were, out of time as a result of fluctuations in the fortunes of firms and the earning prospects of capital assets.

The existence of cycles of the first type implies several important assumptions. It is necessary that assets should all have roughly the same lifetime, or at least a length of life which is a multiple of a number such as five years. Secondly, the dispersion of the lives of individual assets around the mean for their class must be small. Thirdly, other factors must not intervene to cause bursts of investment at times other than those given by the original cycles of reinvestment. If these conditions are not approached closely, the combination of dispersions will necessarily lead to a great reduction in the amplitude of the cyclical movement, and even to its complete disfigurement. The list of assumptions given above could easily be enlarged, but in itself it seems sufficient to suggest the extreme improbability of pure reinvestment cycles playing any clearly defined part in *generating* cyclical activity. Indeed, this seems to be the conclusion reached by the author, who states at the beginning of the third chapter of the theoretical section, "We have seen that the pure reinvestment cycles . . . will show a distinct tendency

to *dampening*”—a remark which he repeats in the first paragraph of the succeeding chapter.

In order to preserve some causal significance for reinvestment activity, Dr. Einarsen then proceeds to a discussion of secondary reinvestment cycles. These, however, though they retain the word reinvestment, do not help to restore its position, since they are by definition due to a shift in the “natural” time of replacement to a time when prospects are better. Here, then, we seem to arrive at a conclusion rather different from our original one—namely, that reinvestment on the whole depends on the state of trade rather than that the state of trade depends on independent cycles in reinvestment.

We come now to the empirical part of the study, which deals with new investment and reinvestment in the Norwegian shipping industry. This is the most interesting and original section, though it could hardly prove the author's thesis, since it deals only with one *comparatively* homogeneous industry instead of with activity as a whole in which the varying lifetimes of assets and other factors would have a disturbing effect.

Dr. Einarsen gives a full discussion of the practical difficulties encountered in separating new investment from replacement over the period of his investigation. The results are of great interest. It appears that reinvestment cycles have considerable amplitude, and on the whole slightly precede those in new investment. This seems reasonable, since it may be supposed that shipowners try to improve their fleet after a bad period before they increase the number of their ships.

Another factor which this investigation brings out clearly is that there are two well-defined modal periods at which first-owners dispose of their ships. One of these is surprisingly early—after eight or nine years—and the other at eighteen to nineteen years, a period frequently cited in past literature. In addition to the detailed study of first-owner ships, there is also a chart showing the number of ships surviving from a given stock at each year of life up to age 34.

This investigation is the third publication of the University Institute of Economics, Oslo, which has appeared in English. All English readers must wish to express to the Institute their gratitude for the way in which the work of Norwegian economists and statisticians is brought within their reach, and hope that in the future they will have the further advantage of studies appearing in the English language.

R. W. S.

12.—*International Combines in Modern Industry*. By Alfred Plummer, LL.D. London: Pitman, 1938. $8\frac{1}{2}'' \times 5\frac{1}{2}''$. ix + 302 pp. 10s. 6d.

This is the second edition of a book which contains a useful collection of facts relating to the international workings of capital. Premising that the assumption of free competition can no longer be maintained, Dr. Plummer (who is the Head of the Department of Commerce and Social Studies in the South West Essex Technical

College) distinguishes two main types of organization—the alliance of large monopolist businesses in different countries, and the alliance of national cartels to regulate world trade and production. By the side of these we find the international “concern,” or “union, on an international scale, of undertakings which remain juridically independent of one another into a single unit for the purposes of productive technique, trading, administration and finance”; such is the group of interests known as “Sofina.” We have also holding companies and subordinate companies of a main undertaking established in different countries to escape the operation of import duties. The field, it will be seen, is very wide, and there is some degree of cross-division, while the same economic considerations do not apply in all cases. The first four chapters give a general survey, and then discuss the types of international combines and the aids, incentives, and obstacles to their formation, the argument being abundantly illustrated by examples of the working of unions of varying degrees of permanence. The fifth chapter deals with the reservation of home markets and with the division of “neutral” markets by quotas.

Next follow two chapters on “effects and tendencies” and “future prospects.” The possibility of potential competition through substitutes or otherwise is raised, and the author concludes that, “given a wise price and output policy, an international combine may well succeed in imparting greater stability to prices than would otherwise exist, so long as the combine itself is stable and likely to last,” and by preventing dumping may remove “one of the causes of sudden and unpredictable price fluctuations.” Existing tariffs are not likely to be dispensed with, but the existence of an international cartel may prevent their being raised, as such action always has a disturbing effect. The interests of workers can always be maintained by the organization of international alliances of trade unions. As to the effect of international combines on the community as a whole, it seems that all that can be said is that when they are good the effects are good, and when they are bad the results are very bad. Control is extremely difficult, and Dr. Plummer suggests the setting up of “a central institution under the League of Nations, to which complaints and appeals might be addressed, and from which information and enquiries might be sent to appropriate national public authorities.” The requirement of publicity would be very useful. In any event “international combines are likely to increase and spread,” and the author regards the organization of international air transport as an example of useful co-operation and the present internationalization of armaments production as one likely to “bring disaster and tragedy to the common people.” On this point it may be remarked that the chart facing page 236, showing the interests and connections of the Vickers Company, while interesting, gives a false idea of its power by the heading “The Vickers Combine.”

On the whole this book is to be recommended as a repository of information and as a fair analysis of the merits and demerits of international combinations.

H. W. M.

13.—*Argentine Meat and the British Market*. By Simon G. Hanson, Department of Economics, University of Louisville. California: Stanford University Press. London: Milford, 1938. 9½" × 6½". vii + 294 pp. 16s.

"This study," says the author, "was originally undertaken as a doctoral dissertation at Harvard University," and it is marked by that comprehensiveness and that painstaking attention to detail which characterize the best American theses of this nature. In the seventies of last century Argentina was mainly a pastoral country, her exports of beef being in the dried or jerked form, and later in extracts and canned meat. The discoveries of refrigeration processes at first benefited mutton exports, and the United Kingdom derived its imported supplies of beef and cattle from North America. Argentina started the export of cattle and frozen beef in the nineties, but up to the end of the century the exports of frozen beef from Australia and New Zealand were far greater. The demands of the United States domestic market gradually killed the export trade in beef from that country, and after difficult experiences it was found possible to ship chilled meat from the River Plate. The American meat-packers did not want to lose their export business, and Swift and Co. were the first to acquire a frigorifico in Argentina. Others followed, and their great resources and efficiency soon gave them a commanding position in the trade.

Fear of the "beef trust" soon developed, and a Departmental Committee reported in 1909 that the American companies were "carrying on their business in co-operation rather than in competition." But such co-operation among meat importers dated back twenty years before the arrival of the Americans on the scene, and it is obvious that the trade in so perishable an article as chilled beef could not be left to the mercy of violent fluctuations of price arising from the unregulated arrival of cargoes. The price war of 1911, when British markets were glutted with supplies, was quite another matter, for it was plainly designed to capture trade from the weaker British and Argentine firms, and achieved its object. Another war for quotas in 1913 fortunately ended before the European War broke out.

That war brought prosperity to the meat companies and to the cattle-raisers of the Argentine, but in that country it produced a speculative land-boom which crashed disastrously after normal trading conditions were restored. On the meat-exporting side the situation was complicated by Vesteys (who had started a large new works in Argentina during the war, and who acquired the British and Argentine Meat Co. in 1922), for, equipped with freezing works, refrigerated ships, cold storage, and a great array of retail shops, they could talk with the Americans in the gate. The conference by which the trade was pooled was suspended in April 1925; in November 1926 Vestey, Swift, and Armour settled their differences, but it was not till nearly a year later that allotments not too unsatisfactory were made to the smaller companies. The more recent phases of the meat business are the appeal of the Argentine cattle-raisers to their Government for support against their too powerful

clients, the entry of the meat companies into the native meat trade, and the desire of the British Government to regulate imports so as to secure a larger share of the British market to British and Dominion producers. As for the situation in the Argentine, Dr. Hanson says: "The tendency seems definitely to be toward a larger permanent participation of the State in the meat trade: in the creation of demand abroad by trade treaties and propaganda, in the exercising of control over the operations of private packers, and in the preparation of meat for export."

H. W. M.

14.—*The Growth of Collective Economy.* By F. E. Lawley. London: P. S. King, 1938. 2 vols. $8\frac{1}{2}'' \times 5\frac{1}{2}''$. xx + 524 pp., xv + 485 pp. 35s.

This book defies the reviewer who has to work within a small compass, but it will be found a mine of information on some recent economic developments. The theme of the first volume is the growth of national collective economy. "To an increasing extent private property is being disciplined by the State; and there is a growing measure of State intervention in economic life, which occurs in a great variety of ways. Rationalization, moreover, has an increasingly collective tendency." *Laissez-faire* has broken down, and its weak points have been exposed especially since the War. In succession the author discusses the rôle of the State, the arguments for taking property by confiscation or with compensation, and the various methods of State intervention. The experience of many countries in public ownership with or without direct operation; sundry examples of actual or proposed special forms of administration (in which Germany and the United States are fruitful); methods of public control such as our own Agricultural Marketing Boards, buying Commissions, Import Boards, Commissions for housing and slum clearance, schemes for special industries such as coal, iron and steel, and cotton—all these are summarized for various countries in 229 pages of the first volume. The developments of rationalization, as in the British shipbuilding industry, are next set forth. "Central control of the whole national economy" next occupies attention—national economic councils as in France, national organization for external economic relations, the possible economic development of the League of Nations. Lastly some economic effects of collective enterprise are discussed, such as the "profits basis" as an incentive to industry and the greater responsibilities of a collective system, and special consideration is given to the claims of the workers and administrative staff.

The second volume treats of the growth of international collective economy, and an elaborate discussion is developed on the treatment of basic commodities, such as food and raw materials, which are in limited supply. The author holds that there must be first national control on which international co-operation can be built, and abundant evidence is adduced of such co-operation both directly through Governments in such matters as communications, postal services, etc., and more recently through the activities of

the League of Nations. Even barter agreements are of importance. The value of local groupings such as the Scandinavian Economic Unity is appraised, and then Mr. Lawley sets out his own views on the possibility of world organization, finding that the failures of the Socialist movement and of the League of Nations are due to their domination by "free-trade ideology." Gradually, production, international trade, banking, credit and currency, transport, and distribution must be organized, internationally, and the importance of the International Labour Office and the Bank of International Settlements is stressed. Over all will sit a World Economic Council, comprising representatives of important interests, such as Governments, experts in business, commercial, financial, scientific, and technical questions, and workers' and consumers' interests, and possessed of "full authority in international economic matters."

If some of the superstructure which the author has built up seems somewhat flimsy, these two volumes nevertheless remain a valuable collection of facts up to May 1936, and a useful store of ideas and arguments.

H. W. M.

15.—*A History of Economic Thought*. By Erich Roll. London : Faber & Faber, 1938. 9" × 5½". 430 pp. 12s. 6d.

History, like pen-drawing, may be regarded as the art of leaving out, but in the former case, what is included does not necessarily suggest what is left out. Far from it. Too often, the criteria of omission or inclusion are hidden, if not from the writer himself, at least from the majority of his readers.

In an effort to avoid such dangers, Professor Roll starts off with an express statement of his criteria of selection, and the main assumptions upon which he has worked. He adopts the policy of including, apart from particularly outstanding economists of past days, only those whose contributions are significant in relation to the broader lines of present-day theory and controversy. Other writers in this field—for example, Ingram and Gide and Rist—have set out with this same guiding principle, but the result was different, for the times were different.

In the light of present circumstances, the principle has led Professor Roll to give little or no space to writers formerly regarded as important, while others, relatively unknown, now receive lengthier treatment. Marx alone gets a chapter to himself; Adam Smith gets thirty pages and Ricardo eighteen; Auguste Walras gets three lines, J. S. Mill fifteen pages, Bagehot, Fawcett, and Sidgwick get none, while twenty pages are devoted to the German Romantics. In the briefer references to modern thought, Mr. Keynes gets five lines and Professor Robbins an unindexed footnote. Such an allocation of space will at least give economics students something to think about. And to provoke thought is, perhaps, one of the most valuable functions of a history of thought.

Throughout the book the author avowedly adopts two guiding principles: firstly, that the actual economic structure and the changes therein are the *ultimate* determinants of economic thought, and, secondly, that the appearance of certain ideas is not fortuitous,

but is dependent upon causes which can be discovered. Careful interpretation is clearly called for in such deterministic generalizations, the truth of which is more immediately apparent in earlier than in more recent thought, and in the more realistic branches of economics than in the pure theory. Favourable ground for testing such beliefs might be expected in the supposedly independent discoveries of the marginal utility trinity, Jevons, Menger, and Walras, but we are offered little explanation of their coincidental appearance or of their relation to earlier mathematical thought, although we are told that Jevons did not know at the time of Cournot's work, from which the modern school was separated "only through the accident of history."

The author is more successful in the earlier periods of his study in showing the causal connections between economic practice and thought. Here at times it reads like economic history rather than a history of economics, but the two are then welded together in a way at once stimulating and convincing.

This book should find a wide circle of readers amongst the students for whom it is mainly intended. Professor Roll envisages the increasing danger of student myopia, the danger in the maze of modern theoretical refinement, of losing sight of the practical and wider importance of economics. He has set out to provide a corrective, and he has singularly succeeded in his task. C. O. G.

16.—Other New Publications.*

Hiskett (W. R.) and Franklin (J. A.). Searchlight on Social Credit. With an Introduction by Kingsley Martin. London: P. S. King, 1939. 8½" × 5½". 173 pp. 8s. 6d. net.

[The expert is not in need of a detailed refutation of Major Douglas's Social Credit scheme or of the dogmas of the "New Economics" in which he has draped it. But those who have no acquaintance with the working of the economic machine, and being excusably impressed with his insistence on the paradox of poverty in the midst of plenty, are anxious to discover the truth of the matter, will find it in this book. One of the authors began as an exponent of the theory, but the researches he undertook in order to justify his creed convinced him that it was unjustifiable. The reader is here shown exactly why, and each separate fallacy is pinned down for him. The motto of the book is "And they came unto Alberta," and the epilogue describes the adventures of Social Credit and its followers in that province. There is entertainment as well as instruction in the volume.]

Mises (R. von). Probability, Statistics and Truth. Translated by J. Neyman, D. Sholl, and E. Rabinowitsch. London, Edinburgh, Glasgow: Hodge, 1939. 8½" × 5½". 323 pp. 12s. 6d. net.

[Readers are referred to the lengthy review of the German original, *Wahrscheinlichkeit, Statistik und Wahrheit*, in the last number of the *Journal* (Part I, 1939, pp. 86–89), which ended with the remark that the book should be translated into English. The injunction has been promptly obeyed and the translation appears to have been well done. The arrangement of the original has been followed exactly. The index of proper names has, however, been omitted, which seems a pity.]

* See also "Additions to Library," p. 340.

Papi (Giuseppe Ugo). The Colonial Problem. An Economic Analysis. London: P. S. King, 1938. $7\frac{1}{4}'' \times 5''$. 70 pp. 4s. 6d.

[The author begins by tracing colonial expansion through three phases, the first the period of the monopolistic system of colonial trade, the second, definitely capitalistic, developing contemporaneously "with the change from agriculture to industry which marked the activities of certain European countries"—this was the period of evolution towards free trade—and the third, the return to protection. The next chapter consists of a theoretical review of the problem of colonial economy, and the third and last discusses the principles of tariff policy between mother country and colonies. There is an index.]

Qureshi (Anwar Iqbal). The State and Economic Life. Being a Study of the Methods of State Intervention in Economic life in the Leading Countries of the World with special reference to the problems facing India. With a foreword by Vera Anstey. Bombay: New Book Co., 1938. xi + 208 pp. $8\frac{1}{2}'' \times 5\frac{1}{2}''$. Rs. 5; 7s. 6d.

["To bring to the notice of my countrymen the changes which the post-war European economy is undergoing, how far the policy of economic nationalism has been fostered, and what might be its effects on our exports." This, in the author's words, is what he sets out to do. "The mere passing of a law, State intervention . . . even the undertaking of certain enterprises by the State itself, will not solve our problems," he affirms. "India needs greater general education, both liberal and industrial, and greater facilities for research work." In his first chapter he discusses "Government economics," the policy opposed to *laissez-faire*. He asks "Is the government capable of administering the business of the people?" and proceeds to answer this by describing what different governments have done in recent years to remove the defects of the existing social system. His next chapter deals with planning. He examines the present system of unplanned economy and discusses some examples of planning under the capitalistic system. Our own Milk Marketing Board and Pig and Bacon Boards come under discussion here; President Roosevelt's New Deal is later given a chapter to itself. The longest chapter in the book is devoted to the Control of Prices, the first two sections dealing with government measures in different countries to control imports and encourage exports, and the third with production aids, and measures tending to restrict production. There is a chapter on The State and Economic Life in Germany, and finally one on Economic Problems in India. In this the author outlines briefly what he considers should be the future economic policy of India. The book contains an index.]

Vakil (C. N.) and Maluste (D. N.). Commercial Relations between India and Japan. London: Longmans, 1937. $8\frac{1}{4}'' \times 5''$. 210 pp. Rs. 7. as. 8.

[This is a volume of the "Studies in Indian Economics" edited by Professor Vakil, who occupies the Chair of Economics in the University of Bombay. The prevalent mode of economic nationalism necessitates counterplanning to circumvent the obstacles to international trade, and the first desideratum is knowledge of the existing conditions. In these studies of Indian trade the authors have begun by examining that with Japan, which is steadily increasing in importance. Moreover the methods by which Japanese industry and trade have been rapidly and successfully built up are recognized to offer useful lessons. The first part of the book is accordingly devoted to a review of the economic development of Japan. Next come details of Indo-Japanese trade, one chapter being given to raw cotton and cotton piece goods, which consti-

tute, respectively, the chief imports and exports between the two countries, and the next two to a summary account of the various "other" exports and imports. The authors then review the present tendencies of India's trade with Japan, and tables show its amount compared with India's total trade for each of the years 1922-23 to 1935-36. It is seen that since 1930 the volume of total trade in either direction has shrunk considerably; so has the trade with Japan, but the decrease in imports from Japan is slight. Thus, even during the depression Japan has managed to improve her relative position in the Indian market. Discussing Japanese competition, which, impelled by necessity, has been persistent and successful, the authors agree with previous investigators that it cannot be called "unfair," in that labour conditions are better than in India. Greater efficiency of labour and vastly superior organization, readiness to adopt new methods, and unceasing energy, account for the results. The Indo-Japanese trade agreements of 1934 and 1937 are described in the final chapter and the texts are given as appendices.]

The World Agricultural Situation in 1936-37 and 1937-38. International Institute of Agriculture, Rome, 1939. 275 pp.

[This is a valuable publication for those interested in the changes which are taking place all over the world in the organization of agriculture and in the trade in agricultural products. A general indication of its scope may be gathered from the titles of the six chapters or sections into which it is divided—viz., (1) Agricultural production and the supply of agricultural products. (2) The general economic background of the agricultural situation. (3) International economic relations. This deals generally with trade and commercial policy. (4) World trade in agricultural products. (5) Agricultural prices and incomes. (6) Agricultural policies in the different countries. In this section, an account is given of the action taken in some 24 separate countries.]

STATISTICAL NOTES

(i) BRITISH OFFICIAL STATISTICS.

ON page 323 we give our usual table summarizing the oversea trade of the United Kingdom for the years ended February 1938 and 1939. The figures for the first two months of this year continue the trend of those for the last quarter of 1938, imports showing a marked decline in value and exports a much smaller reduction. In the last three months of 1938 the excess of imports over exports averaged £14·7 million a month less than a year earlier; the corresponding average for January–February 1939 shows a decline of £8·8 million. The decrease in the adverse merchandise balance for these two months from £71·6 million to £54·0 million resulted from a fall of £18·8 million in retained imports and one of only £1·2 million in exports of United Kingdom goods. Nearly one third of the reduction in value of retained imports was in the iron and steel groups, including iron ore.

Total imports during January and February 1939 were valued at £140,905,000, as compared with £160,633,000 a year earlier. Re-exports declined from £10,323,000 to £9,366,000 as a result essentially of smaller exports of non-ferrous metals, mainly nickel. Last year the purchases of non-ferrous metals by the Soviet Union were abnormal, and the figures for January–February show a decline from £1,605,000 to £474,000.

The value of retained imports of food, drink and tobacco amounted to £63,292,000, being £4,105,000 less than a year earlier. The principal decrease was £4 million in respect of grain and flour. This was due to the heavy fall in average values which occurred during the year, retained imports of grain and flour in the aggregate being about 9 per cent. higher than a year ago as a result of a marked increase in imports of wheat. A relatively small decline was recorded in the value of retained imports of meat, the quantity of mutton and lamb imported showing a considerable reduction, while average values were not greatly different from last year. Changes in retained imports of butter, cheese, eggs, tea, and sugar were unimportant, but there was some decrease in respect of tobacco from the high level of imports last year, and the value fell by nearly £1 million.

Retained imports of raw materials fell by £10,234,000 to £33,020,000, partly as a result of an increase of £610,000 in re-exports.

There was a fall from £3.5 million to £0.9 million for iron ore and scrap. Retained imports of cotton declined by £2.8 million and of rubber by £1.8 million, due in each case to a substantial reduction in quantity. There was, on the other hand, an increase of £1.5 million in retained imports of wool, notwithstanding a decline in average value to the lowest figure since the middle of 1935.

A decrease from £38,642,000 to £33,956,000 was recorded for retained imports of articles wholly or mainly manufactured. About two-thirds of this reduction was due to smaller imports of iron and steel, the value declining by £3.1 million and the quantity by over 70 per cent. This year's figures are the more normal as arrangements were in force last year for increased imports, these ceasing at the end of March. Retained imports of refined petroleum showed no substantial change, but the value fell by £0.7 million. There was a rise of £0.5 million for non-ferrous metals owing to the smaller re-exports already mentioned.

Exports of United Kingdom goods during the first two months of this year were valued at £77,530,000, being £1,214,000 less than a year earlier. For food, drink, and tobacco there was a decline of £197,000, while the value of raw materials exported showed no change from last year. There were much larger exports of wool and of staple fibre, but exports of coal fell in value by £244,000. In quantity coal exports declined by 280,000 tons (5 per cent.) owing to a marked reduction of 412,000 tons in exports to France and of 193,000 tons in exports to Spain. Increases exceeding 100,000 tons were recorded for Germany and Denmark. Exports of manufactured goods fell by £1,452,000 to £60,879,000, notwithstanding an increase of £3,339,000 for vehicles. This increase was due to larger exports of ships and boats, of which war vessels accounted for £2,832,000. The reduction in value of manufactured goods was very widely spread, but the bulk of the decline was in respect of iron and steel (£2.2 million) and cotton goods (£1.3 million).

The fall in value of the exports of iron and steel was due almost entirely to a decline in quantity by 90,000 tons (26 per cent.). The largest reductions were in respect of tinned plates and railway material, while among the relatively few increases may be mentioned galvanized sheets and wrought tubes. Exports of machinery fell by 9,300 tons (12 per cent.), over half the decline being in textile machinery, while exports of machine tools more than doubled as a result of heavy purchases by the Soviet Union. In the vehicles group there was again a considerable increase in exports of aircraft in addition to the large exports of ships already mentioned. Exports

Movements and Classes	Twelve Months ended February 1938	Twelve Months ended February 1939	Increase (+) or Decrease (—)
Imports, c.i.f.—	£'000	£'000	£'000
Food, drink and tobacco	437,764	427,183	(—) 10,581
Raw materials and articles mainly un- manufactured ... }	315,612	237,979	(—) 77,633
Articles wholly or mainly manufac- tured ... }	280,794	227,660	(—) 53,134
Other articles ...	6,957	7,887	(+) 930
Total Imports ...	1,041,127	900,709	(—) 140,418
Exports, f.o.b.—			
<i>United Kingdom Produce and Manufactures—</i>			
Food, drink and tobacco	38,476	35,714	(—) 2,762
Raw materials and articles mainly un- manufactured ... }	63,559	56,924	(—) 6,635
Articles wholly or mainly manufac- tured ... }	407,383	363,920	(—) 43,463
Other articles ...	13,061	13,112	(+) 51
<i>Imported Merchandise—</i>			
Food, drink and tobacco	13,328	12,218	(—) 1,110
Raw materials and articles mainly un- manufactured ... }	34,109	30,866	(—) 3,243
Articles wholly or mainly manufac- tured ... }	25,352	16,849	(—) 8,503
Other articles ...	638	718	(+) 80
Total Exports ...	595,906	530,321	(—) 65,585
Bullion and Specie—			
Imports ...	298,496	229,501	(—) 68,995
Exports ...	205,132	364,697	(+) 159,565

Movements of Shipping in the Foreign Trade—	Number of Vessels	Thousand Tons Net	Number of Vessels	Thousand Tons Net	Number of Vessels	Thousand Tons Net
<i>Entered with cargoes—</i>						
British ...	25,099	39,595	24,036	38,805	(—) 1,063	(—) 790
Foreign ...	28,436	31,313	25,706	28,974	(—) 2,730	(—) 2,339
Total entered ...	53,535	70,908	49,742	67,779	(—) 3,793	(—) 3,129
<i>Cleared with cargoes—</i>						
British ...	30,891	35,882	29,271	34,491	(—) 1,620	(—) 1,391
Foreign ...	23,580	25,319	21,620	24,554	(—) 1,960	(—) 765
Total cleared ...	54,471	61,201	50,891	59,045	(—) 3,580	(—) 2,156

of motor vehicles of all kinds, including chassis, were smaller than a year ago.

The quantity of cotton piece goods exported declined by 26 million square yards (10 per cent.), of which nearly one half was in exports to India and Burma. The decline in exports of woollen and worsted tissues was rather less. There were, on the other hand, larger exports of the less finished goods, cotton yarns, wool tops and woollen and worsted yarns all being exported in appreciably greater quantity than a year ago. Exports of textile goods to the United States have risen appreciably as a result of the lower duties embodied in the recent Anglo-American Trade Agreement, and this led to a rise in total exports of both linen and jute piece goods.

Imports of bullion and specie during January and February were comparatively small (£9.9 million), while exports amounted to the high figure of £50.2 million, of which £47.2 million went to the United States. The excess of £40.3 million in exports compares with an import excess of £21 million in the first two months of last year and a monthly average of £31½ million outwards in the last five months of 1938.

Compared with December 1938 there was a decline in general *wholesale prices* over the two months January and February 1939 of about 1.5 per cent. The Board of Trade index number of wholesale prices, which had been falling almost continuously since July 1937, reached 96.8 in February 1939. In July 1937 it stood at 111.5, and in December 1938 it was 98.3 (average 1930 = 100). The fall during the two months was about 2 per cent. in the prices of industrial materials and manufactures, and 0.8 per cent. in those of articles of food. The article showing the most decided advance was raw jute, which rose in price 22 per cent. during the two months. Prices of British and New Zealand butters and coffee advanced about 13 per cent. and there were smaller advances in bacon, mutton, potatoes, and sugar. There was the usual seasonal decline in the price of eggs. Prices of most classes of iron and steel declined, but the over-all reduction from the prices current in 1938 was just under 6 per cent. The decline in ship plates was about 7½ per cent. and in pig iron about 9 per cent. General wholesale prices are now lower than at any time since September 1936, when the index number stood at 96.1.

As compared with February, 1938, cereal prices in February, 1939 showed a fall of over 29 per cent., cotton and cotton yarn and cloth about 9 per cent., and paper-making materials about 35 per cent. On the other hand, jute prices advanced 25 per cent. and tin 19 per cent.

The Board of Trade index numbers of wholesale prices for the three months December 1938 to February 1939 are given below :—

(Averages for the year 1930 = 100)

Date	Total Food	Total not Food	All Articles	Basic Materials	Inter-mediate Products	Manufactured Articles	Building Materials
Dec. 1938	91·8	101·7	98·3	89·9	102·5	111·2	103·5
Jan. 1939	92·5	99·6	97·2	90·0	98·9	108·1	102·3
Feb. ..	91·1	99·7	96·8	89·9	98·8	108·4	102·1
<i>Feb. 1938</i>	<i>103·4</i>	<i>106·9</i>	<i>105·8</i>	<i>100·2</i>	<i>106·4</i>	<i>113·4</i>	<i>104·7</i>
<i>.. 1937</i>	<i>98·6</i>	<i>106·5</i>	<i>103·9</i>	<i>120·9</i>	<i>104·3</i>	<i>103·2</i>	<i>101·2</i>
<i>.. 1936</i>	<i>88·1</i>	<i>93·6</i>	<i>91·7</i>	<i>96·3</i>	<i>90·1</i>	<i>96·1</i>	<i>94·9</i>

The figures of certain other British index numbers of wholesale prices and the official index numbers of wholesale prices in France, Germany and the United States are given below for comparison :—

Date	Board of Trade (1930 = 100)	<i>Economist</i> (1927 = 100)	<i>Statist</i> (1866-77 = 100)	<i>The Times</i> (1913 = 100)	France (<i>Stat. Generale</i>) (1929 = 100)	Germany (<i>Stat. Reichsanzt.</i>) (1929 = 100)	U.S.A. (Bureau of Labor) (1926 = 100) ^a
Dec. 1938	98·3	68·6	89·1	113·8	109·1	77·5	76·9
Jan. 1939	97·2	68·7	88·7	113·5	109·9	77·7	76·7
Feb. ..	96·8	68·5	88·6	113·2	109·3	—	76·6

* Mean of weekly prices.

There was some slight decline in the average level of *retail prices* of articles of working-class consumption during the two months January and February 1939, chiefly due to a considerable seasonal fall in the price of eggs and a smaller fall in the price of milk. On the other hand, the prices of both fresh and salt butter advanced to a small extent. The retail index number of food prices of the Ministry of Labour dropped from 138 at the beginning of January to 135 at the beginning of March 1939. (Prices at July 1914 = 100.) With the exception of a slight advance in the price of coal, the general level of other prices remained stationary, and the resultant index number for prices of food and all other articles stood at 153 at March 1st, compared with 155 at the beginning of January. At March 1st, 1938, the index number for prices of food was 140, and the number for all articles (food, rent, clothing, fuel, etc.) was 156. There is a general tendency in the earlier months of the year for food prices to fall to some appreciable extent, due to seasonal influences. The only recent year in which this decline was not noticeable was in 1937.

The complaints as to the financial position of the agricultural industry, which have lately been voiced with so much energy, give a special interest to the *index number of agricultural prices* for the past year. The complaints were directed in the main to the fall in prices of certain specific articles, and were not applicable to the whole range of agricultural produce. In fact, of the 24 commodities or groups, included in the index, 11 rose in price, 11 fell and in the remaining 2 no change occurred. As a result, the general index number, which had risen slowly but steadily from 77 in 1933 to 90½ in 1937, only fell by ½ a point to 90 in 1938, and was itself higher than in any other year since 1930. The products which chiefly suffered were cereals, sheep, potatoes and wool, while increases were recorded in the case of cattle, milk, butter, poultry, fruit and sugar beet.

The commodities included in the general index are divided by the Ministry of Agriculture into three groups, and the fluctuations in these groups and in the general index are shown below for the past five years. The figures take into account the subsidies under the Wheat and Cattle Acts and the payments for milk. (Base 1927-29 = 100.)

	1934	1935	1936	1937	1938
Cereals and farm crops ...	78½	82	93½	98½	86½*
Live stock and live stock products ...	78	77	79½	88	88
Fruit, vegetables and glass-house produce ...	81	104	86	93	105½
General index ...	78½	81	82½	90½	90*

* Provisional.

It will be seen that the averages of the groups do not reflect any exceptional disturbance of prices, only the farm-crop group showing any actual fall in 1938, and even so the average for that year was above the level of 1934 and 1935.

A better idea of the movement can be obtained by taking separately the commodities which on the average of the year showed a decline. This is done in the following table, though here again it is noticeable that although the drop between 1937 and 1938 was appreciable, low figures for several of these commodities were also recorded in earlier years. The annual averages, however, to some extent conceal the exceptionally low rates prevailing in certain months of the year, particularly in the autumn. For example, the minimum monthly index (corrected for seasonal variation) for barley was 68; for oats, 68; for sheep 61; for ewes, 65; for cheese 62; and for potatoes, 64.

	1934	1935	1936	1937	1938
Barley	86	80	86	109	84
Oats	69	71	70	92	79
Fat sheep	80	82	80	90	69
„ ewes	73	73	73	82	70
„ lambs	79	75	80	89	69
Potatoes	68	84	122	120	87
Wool	54	54	60	94	51

Wheat is not included in the above table, as although the market price fell severely, the effect of the subsidy was to maintain the index at 95, in 1938, as against 96 in the preceding year.

The Ministry of Agriculture has not yet issued a revised index number of the *prices of feeding-stuffs and fertilizers* based on 1927-29, and otherwise comparable with the index number of agricultural prices. In the meantime, the figures for 1938 on the old base 1911-13 have been made available, and show a decline in the price of feeding stuffs from 120 in 1937 to 113 in 1938, and an increase in fertilizers of one point from 92 to 93. If, for purposes of comparison with the index number of agricultural prices mentioned above, these figures are converted to the 1927-29 base, the feeding-stuffs index for 1938 becomes 78 and the fertilizers index 90.

The decline in *employment* which usually takes place towards the end of December and the first half of January was accentuated somewhat in the Ministry of Labour's January recording (January 16th) by the severe weather prevailing at that date. The number unemployed in the building and public-works construction industries increased by more than 65,000 during the five weeks' interval. Most of this loss had, however, been recovered by the middle of February 1939, when the rate of unemployment in Great Britain and Northern Ireland, in the insured trades (including agriculture) was 13.2 per cent. compared with 14.1 at January 16th and 12.7 per cent. at December 13th, 1938. The rate at February 14th, 1938, was 12.8 per cent. There was an appreciable improvement in employment over the two months in steel manufacture and in coal-mining, and to a less extent in the cotton industry, while on the other hand there was a considerable decline in the distributive trades, in building and in the furniture trades. Compared with February 1938 employment in February 1939 showed some improvement in all the textile trades except artificial silk-yarn manufacture, and in some of the clothing trades. In many industries, however, there was less employment than a year ago, and this was most

noticeable at coke-ovens and brickworks, in pottery manufacture, at blast-furnaces and steelworks, and to a somewhat less extent in a number of the other metal industries. As regards the distribution of unemployment, the proportion unemployed is still greatest in Northern Ireland, both as regards agriculture and general industry, where the percentages out of work are 29.5 and 26.9, respectively. The proportion is nearly as high in the general scheme in Wales (25.9 per cent). Unemployment of all classes of insured workers was lowest in London (9.1 per cent.), the South Eastern (9.9 per cent.), South-west (8.5 per cent.), Midlands (9.4 per cent.) Divisions. It was highest in Northern Ireland and Wales and in the Northern Division (19.8 per cent.). During the last two years the statistics of unemployment published by the Ministry of Labour have been subject to some changes due to the bringing of agricultural labour into insurance in 1936, the subsequent additions to insurance of certain classes of domestic and agricultural workers, and also a revision of the statistics with a view to greater preciseness in September 1937. The percentages unemployed for the last three months are given below for all insured workers.

Date	Percentage Unemployed in Great Britain and Northern Ireland of workpeople insured under				
	General Scheme	Agricultural Scheme	General and Agricultural Schemes		
			Males	Females	Total
Dec. 12th, 1938 ...	12.9	8.9	13.6	10.5	12.7
Jan. 16th, 1939 ...	14.3	11.1	14.9	12.0	14.1
Feb. 13th, „ ...	13.4	9.8	13.9	11.4	13.2
Feb. 14th, 1938 ...	13.1	8.4	13.1	12.1	12.8

The number of workpeople aged 14 to 64 (insured and uninsured) on the registers of the employment offices of the Ministry of Labour in Great Britain is given below for the latest three months. Of the total unemployed on February 13th, 1939, about 44,000 were boys and girls between 14 and 16 and 41,000 between 16 and 18. About 33,000 of these boys and girls under 18 were in attendance at Authorized Courses of Instruction.

Date	Wholly Unemployed	Temporarily Stopped	Persons normally in casual employment	Total
Dec. 12th, 1938 ...	1,474,019	294,708	62,645	1,831,372
Jan. 16th, 1939 ...	1,594,431	379,027	65,568	2,039,026
Feb. 13th, „ ...	1,538,512	291,680	66,526	1,896,718
Feb. 14th, 1938 ...	1,404,912	335,084	70,425	1,810,421

With the exception of the figure for January 16th, 1939, the number unemployed at February 13th was higher than at any date since February 1936.

2. OTHER STATISTICS.

The *Value of Stock Exchange Securities* continued to decline during January and February 1939, but not to any great extent. The decline was less in the prices of the Fixed Interest Stocks (0.4 per cent.) than in those of the Variable Interest Securities (1.1 per cent.). The fall of prices, though varying in extent from month to month, has been practically continuous since October 1936, and though the March figures of the index number prepared by the *Bankers' Magazine* are not yet available, no arrest in the decline is at present likely to occur in view of the political European crisis. The general index number (values at December 1921 = 100) for February 1939 was 111.7, compared with 112.0 for January, and 112.4 for December 1938. It was lower than at any time since March 1933, when it was 111.2. During the first two months of 1939 British railway debentures showed little change on balance, but preference and ordinary stocks declined, as did British and Indian Funds, but to a smaller extent. The prices of U.S. railway stocks advanced appreciably in January, but fell away almost to the same extent in February. South African mining shares fell nearly 4 per cent. during the period and copper-mining shares 12 per cent.

There was a decline in *shipping freights* in January 1939 and but a slight recovery in February. According to the revised index number of the Chamber of Shipping, freight rates in January and February stood at 120.8 and 121.5, respectively (1935 = 100). Compared with 1929 the rate in February indicated a fall of 9 per cent. Since the end of that month the large number of ships awaiting cargo in River Plate ports has been instrumental in causing the Tramp Shipping Administrative Committee to reduce the existing minimum freight rates for grain from those ports by 20 per cent. and reducing also minimum grain rates from United States ports and from Australia. The President of the Board of Trade announced in the House of Commons on March 29th the revival of the subsidy for tramp shipping, but not quite in the same form as that which expired at the end of 1936.

Over the twelve months February 1938 to January 1939 the total *retail sales*, as given in the statistics prepared by the Bank of England in conjunction with various associations of retail distributors and

co-operative societies, showed an increase of 1·8 per cent. compared with the figures for the previous twelve months. This increase was lower than in any twelve months since 1933. Sales of articles of food and perishables increased 3·7 per cent. but those of other merchandise decreased slightly (0·3 per cent.). The only district showing an actual general decrease was Central and West End London where sales declined 7·0 per cent. The increase in sales was however small in the North-East and North-West Districts of England. The Bank of England has revised its index number of retail sales, making as its base the average daily sales in 1937 instead of 1933 as formerly. The new index number for January 1939 is 98 compared with 98 in January 1938, 93 in 1937 and 75 in 1933, when it was lowest. For food and perishables only the number was 98 in January 1939, 99 in 1938, and as low as 73 in January 1933.

CURRENT NOTES.

FELLOWS will be gratified to know that last February our President, Professor A. L. Bowley, C.B.E., received the signal distinction of being elected an Honorary Fellow of Trinity College, Cambridge. This recognition of his services to statistics is as pleasing as it is merited.

The bibliography of books on economics and statistics is now attaining considerable dimensions, and the student of the development of theory and practice has now many guides at his disposal. Indeed, more than ever before, McCulloch's motto prefixed to his *Literature of Political Economy*—"Nec omnia dicentur sed maxime insignia"—is applicable. That book was published in 1845, and for long has not been easily accessible, so we may welcome its reprinting in the Series of Scarce Works on Political Economy published by the London School of Economics and Political Science. It is No. 5 in that series, was issued in 1938, and forms a volume of xx + 407 octavo pages, price 12s. 6d. The principle of giving a digest of the works included has also been followed to some degree in *Research and Statistical Methodology* (books and reviews, 1933-1938), published in 1938 by the Rutgers University Press, New Brunswick (vii + 100 pp., \$1.25. It is an "experiment with a plan for locating critical reviews of research and statistical methodology books, excerpting evaluative statements, and publishing the collated excerpts annually." We must also remind Fellows that Volume Sixteen of the invaluable *Guide to Current Official Statistics* was issued by the Stationery Office last autumn at the low price of a shilling. Supplemented by the monthly list of *Government Publications*, it should be on every statistician's desk.

Dr. Jacob H. Hollander, Professor of Political Economy in the Johns Hopkins University, has been so generous as to present to this Society a copy (one of 500 privately printed) of the Catalogue of his Economic Library. The dress of the volume is severe in its simplicity, as is appropriate, but the appearance of the contents is such as to warm the heart of any librarian, for he often has to content himself with niggardly space and poor type. The purpose of the collection is to show the historical development of economic doctrines, omitting legal and political tracts. "I have begun," he says, "with the last quarter of the sixteenth century, and taken as the dividing zone of the longer span the middle of the eighteenth century, when tracts gave way to treatises and monographs to

systems. Malthus' 'Essay' marks, naturally enough, the close of the 'middle period,' and it, in turn, comes to an end with the early years of the twentieth century. I have rested with Marshall and those whom he fired." An addition must, however, be made, for, comrade-like, he has included the works of his colleagues at Johns Hopkins, and one notes also other names coming down to 1935. One can safely say that a perusal of the titles in chronological order will both interest and profit the student in search of a guide to the history of economic ideas. One cannot leave the book without a reference to the charming Foreword, in which Dr. Hollander recounts his early adventures as a bibliophile, "with Marshall as philosopher, Edgeworth as friend, Higgs as guide, and Bonar, many times all three," and, like many others, he pays tribute to the "gracious kindness" of Foxwell. As he goes on, the reader feels impelled himself to start a collection of economic rarities, but sadly reflects that, in the words of Andrew Lang's Ballade, "In rich men's shelves they take their ease."

The Council has received with great interest the news of the foundation of the Argentine Statistical Society, which was formally inaugurated on the 23rd of August, 1938, under the presidency of Professor Carlos E. Dieulefait. The President of the Republic, Dr. Roberto M. Ortiz, accepted the office of Honorary President.

The "Sociedad Argentina de Estadística" is constituted as a Section of the Museo Social Argentino, whose director, Señor Tomás Amadeo, was active in fostering its inception. Its purposes, as set out in the printed regulations, are: the study of statistics, theoretical and practical; assistance in the organization and co-ordination of statistical services, both official and private; and the maintenance of relations with analogous associations and with persons engaged in statistical activities, both at home and abroad. Members are to be of four grades: honorary, active, associate, and corresponding. The list of Honorary Fellows elected at the outset includes the name of Professor A. L. Bowley, whose contemporary Presidency of our own Society may be regarded as a happy coincidence; the other names are those of Professor Friedrich Zahn, Armand Julin, Senhor L. S. Bulhoes Carvalho, Dr. Antonia Boháč, Professors Georges Darmois, Corrado Gini and Ramon Beteta, Drs. H. W. Methorst and M. Schellemborg-Orloff. The Society will hold meetings for the reading and discussion of papers and will publish a periodical, *la Revista Argentina de Estadística*, the first issue of which is now in preparation.

OBITUARY

G. I. H. LLOYD

GODFREY ISAAC HOWARD LLOYD, who died on February 9th, 1939, at the age of 64 after a short illness, had been a member of the Society since 1903. He served on the Council in 1935-36. Though he took little part at the meetings of the Society, he had been for many years closely associated with some of its members in his work and at meetings of statisticians and economists. Soon after leaving Trinity College, Cambridge, he was appointed lecturer in Economics at the University of Sheffield. As a result of his experience there he wrote an excellent economic and historical study on *The Cutlery Trades* (1913). In 1909 he was appointed Associate Professor of Political Economy in the University of Toronto. In 1915 he left Canada and was attached to the Ministry of Munitions. After the War he did not return to academic work, but joined the Department of Overseas Trade, of which he became Director in 1930. After retiring from the public service in 1935 he spent two years at Geneva in connection with the Economic Section of the Secretariat of the League of Nations. On his return to England, among other activities he joined the Council of the National Institute of Economic and Social Research, and at the last meeting which he attended he was appointed deputy-chairman.

Expert in economic theory, his bent was towards watching its relationship to actual events, whether past or present ; his interest in administration appeared to his friends to be as much in watching how the machinery worked, as in directing it. The problem set by a nominally free-trade government of encouraging export at the same time that imports were checked, and trade was diverted from foreign countries to the empire, was one which he found very interesting and intriguing. No doubt it was in part due to his wide knowledge of the structure of industry and trade, that a workable compromise was reached.

If one was in doubt, whether on a practical question of the right course to pursue, or on some more theoretical point, or indeed of the qualities and ambitions of co-workers, it was to Lloyd that one wished to take one's problems, feeling sure that he would give a helpful and sane solution.

A. L. B.

STATISTICAL AND ECONOMIC ARTICLES IN RECENT PERIODICALS

UNITED KINGDOM—

Annals of Eugenics, January, 1939—"Student": *R. A. Fisher*. Distribution of groups in a sequence of alternatives: *W. L. Stevens*. A note on the arrangement of incomplete blocks, when $k = 3$ and $\lambda = 1$: *S. R. Saur*. The precision of the product formula for the estimation of linkage: *R. A. Fisher*. The completely orthogonalized Latin square: *W. L. Stevens*.

The Banker—

February, 1939—The Export Credits Guarantee Department: *F. H. Nixon*. Export guarantees abroad: *W. W. Syrett*. The British bank balance sheets. Has Britain inflated? *W. T. C. King*. The defence of sterling: *Paul Einzig*.

March, 1939—Factors distorting bank statistics: *A. V. Barber*.

Bankers' Magazine—

February, 1939—The decline of the maritime industries: *Sir Archibald Hurd*. Credit and trade in 1938.

March, 1939—Bankers' views of the position and outlook.

Biometrika, January, 1939—William Sealy Gosset, 1876–1937: papers by *L. McMullen* and *E. S. Pearson*. The distribution of Spearman's coefficient of rank correlation in a universe in which all rankings occur an equal number of times: *M. G. Kendall*, *Sheila F. H. Kendall*, and *B. Babington-Smith*. The application of the moment function in the study of distribution laws in statistics: *U. S. Nair*. Sampling distribution and selection in a normal population: *Walter Ledermann*. On sentence-length as a statistical characteristic of style in prose: with application to two cases of disputed authorship: *G. Udny Yule*. The comparative advantages of systematic and randomized arrangements in the design of agricultural and biological experiments: *F. Yates*.

Economic Journal, March, 1939—Relative movements of real wages and output: *J. M. Keynes*. Unemployment in the trade cycle: *Sir W. H. Beveridge*. Milk policy and milk prices: *Ruth Cohen*.

Economica, February, 1939—International short-term capital movements: *P. Barrett Whale*. Capital intensity and the trade cycle: *Nicholas Kaldor*. The equation of exchange: a suggestion: *L. M. Fraser*. A survey of milk distribution: *H. S. Booker*.

Eugenics Review, January, 1939—Intelligence and family size: *J. A. Fraser Roberts*. "Intelligence" tests: *C. Spearman*. Latest revision of the Binet intelligence tests: *Cyril Burt*. Unemployment and child-bearing: *François Lafitte*.

UNITED KINGDOM—Contd.

Faculty of Actuaries, Transactions, Vol. XVII, Part II—Accuracy of arithmetical approximation : *G. J. Lidstone*.

Institute of Bankers, Journal, February, 1939—Britain's gold reserves : *Norman Crump*.

Lloyds Bank Ltd. Monthly Review—

February, 1939—The future of international trade : *M. Zvegintsov*.

March, 1939—The Empire and the Anglo-American trade agreement : *H. V. Hodson*.

Population, January, 1939—Population phenomena in Amsterdam : *J. H. van Zanten* and *T. van den Brink*. Quelques remarques sur des statistiques démographiques relatives aux juifs : *G. Frumkin*.

Royal Agricultural Society, Journal, Vol. 99, 1938—Agricultural long-term credit facilities in Great Britain : *D. Witney*.

Sociological Review, January, 1939—Science and the social relations of industry : *P. Sargant Florence*. A study of population in Ulunga, Tanganyika Territory : *A. T. and G. M. Culwick*.

Statistical and Social Inquiry Society of Ireland, Journal, 1937–1938—The trade statistics of the Irish Free State : *G. A. Duncan, J. C. M. Eason, and Stanley Lyon*. Future possibilities of Irish agriculture : *Henry Kennedy*. The economic and social organisation of National Socialist Germany : *F. T. Lloyd-Dodd*.

INDIA—

Indian Journal of Economics, January, 1939—Unemployment in India : *M. P. Gandhi*. A study of population movement in India : *B. G. Ghate*.

Sankhyā, Indian Journal of Statistics, December, 1938—Proceedings of the first session of the Indian Statistical Conference, Calcutta, 1938 : medical and public health statistics, economic statistics, standardisation in industry. [Various papers.]

AUSTRALIA—

Economic Record, December, 1938—The co-ordination of road and rail transport in New Zealand : *J. Williams*. Australia's national income : *F. R. E. Mauldon, L. F. Giblin, Colin Clark*. The population policy of National Socialist Germany : *A. Lodewyckx*.

UNION OF SOUTH AFRICA—

South African Journal of Economics, December, 1938—A survey of commercial air transport with special reference to Europe, 1926–1937 : *E. D. Weiss*.

UNITED STATES—

Actuarial Society of America, Transactions, Vol. XXXIX, Part 2—

An estimate of the effect of extraordinary mortality based on the experience of the World War and influenza epidemic : *Richard Baldwin*. Mortality of Fellows of the Actuarial Society of America : *John R. Larus*.

*American Academy of Political and Social Science, Annals, January, 1939—*Ownership and regulation of public utilities : attacking the problem of satisfactory management of public utilities in the public interest. [Whole number.]

*Econometrica, January, 1939—*A misunderstanding in index-number theory : the true Konüs condition on cost-of-living index numbers and its limitations : *Henry Schultz*. The problem of the true index of the cost of living : *A. A. Konüs*. A dynamic scheme for the British trade cycle, 1929–1937 : *E. A. Radice*. Periodogram analysis with the phase a chance variable : *Edward L. Dodd*. Full employment with a non-homogeneous labour force : *Henry Smith*.

*Harvard Business Review, No. 2, 1939—*Agriculture and the nation's business : *Joseph S. Davis*. Regulatory taxation : *Alfred G. Buehler*.

Journal of Political Economy—

*December, 1938—*Interrelations of production, price, and derived demand : *Jacob L. Mosak*. Collective wage-making in Sweden : *Paul H. Norgren*. The silver episode, II : *Herbert M. Bratter*. False issues in the interest-theory controversy : *E. S. Shaw*.

*February, 1939—*The new collective bargaining in mass production : methods, results, problems : *Emily Clark Brown*. A reconsideration of the cobweb theorem : *Norman S. Buchanan*. Interpreting unemployment in terms of family units : *Don D. Humphrey*.

*Milbank Memorial Fund Quarterly, January, 1939—*Summer diets of the poor in Washington, D.C. : *Dorothy C. Wiehl* and *Carroll E. Palmer*. Voluntary and involuntary aspects of childlessness : *Clyde V. Kiser*. Elevated systolic blood pressure in a rural population : *Ralph E. Wheeler*.

*Monthly Labor Review, January, 1939—*Basic problems of the national economy : *Edwin M. Martin*. Labor mobility and relief : *John N. Webb* and *Albert Westefeld*.

*National Bureau of Economic Research, Bulletin 72–73—*Incomes from independent professional practice, 1929–1936 : *Simon Kuznets* and *Milton Friedman*.

*Quarterly Journal of Economics, February, 1939—*Quantitative measurement in economic history : *E. Heckscher*. The voluntary exchange theory of public economy : *Richard Abel-Musgrave*. Tax remission as a means of influencing cyclical fluctuations : *Kenyon E. Poole*. The shifting of sales taxes : *Donald W. Gilbert*. The rate of interest under ideal conditions : *Paul A. Samuelson*.

UNITED STATES—Contd.

Review of Economic Statistics, February, 1939—Fluctuations in United States consumption, 1919–1932: *J. J. Polak*. Seasonal variation in money in circulation: *Bertrand Fox*. Cyclical variations in wage structure: *John T. Dunlop*.

Social Research, February, 1939—Germany's trade monopoly in Eastern Europe: *Mark Mitnitzky*.

BULGARIA—

Statistical Institute for Economic Research, State University of Sofia, Publication No. 2–3, 1938—The foreign trade of Bulgaria after the World War: *Ivan Stefanoff*.

DENMARK—

Nationaløkonomisk Tidsskrift, Part 6, 1938—Guldet og dets nye Rolle paa den økonomiske Verdensscene: *Carl Otto Henriques*. Fra Ligevægtsteori til Konjunkturanalyse: *Svend Laursen*.

FRANCE—

Journal des Économistes, November–December, 1938—Un système particulier d'organisation monétaire: la République Argentine: *Jean Lisbonne*. Le nouveau franc et la réévaluation de l'encaisse de la Banque de France: *E. G.* L'accord commercial anglo-américain: *E. P.*

Journal de la Société de Statistique de Paris—

January, 1939—Statistiques de la prophylaxie de la syphilis en Angleterre et en France: *R. Sorel*.

March, 1939—Considérations statistiques sur le succès aux examens: *G. Barok*. La statistique aux Colonies Portugaises: *A. Reis-Rumina*.

Revue d'Économie Politique, November–December, 1938.—Sur la théorie du profit: *Adolphe Landry*. Comment se pose actuellement la question des étalons de valeur? *Maurice Ansiaux*. Les fonds d'égälisation des changes et leur action sur les prix et sur l'activité économique: *Charles Rist*.

GERMANY—

Blätter für Versicherungs-Mathematik und verwandte Gebiete, February, 1939—Ein arithmetischer Durchschnittsbeitrag besonderer Art für die Gruppenversicherung: *Franz Knörlein*. Untersuchungen über Beleihung und Storno in der Lebensversicherung mit Hilfe mathematisch-statistischer Methoden: *Georg Heubeck*.

Vierteljahrshefte zur Wirtschaftsforschung, Part 3, 1938–39—Die Wirtschaftslage in Deutschland. Die Wirtschaftslage in der Welt.

GERMANY—*Contd.*

Weltwirtschaftliches Archiv—

January, 1939—Das Theorem der komparativen Kosten und die Theorie des internationalen Handels: *H. W. J. Wijnholds*.

March, 1939—Die Bedeutung der Kapitalbeteiligung: *F. G. Conolly*. Wieweit sind Volkseinkommen international vergleichbar? *Paul Jostock*. Der französische Geldmarkt: *Jean Marschal* und *Gilbert Guenser*. Einige Entwicklungstendenzen im Aussenhandel der Balkanländer: *Vladimir Pertot*. Britisch-Indien als Absatzmarkt für Kraftfahrzeuge: *Anton Zottmann*.

Zeitschrift für die gesamte Versicherungs-Wissenschaft, February, 1939—Preisbildung, Preisstop und Preissenkung in der deutschen Kraftfahrzeugversicherung: *Horst Wagenführ*. Die Entwicklung der Luftversicherung in Deutschland seit 1928: *Hermann Döring*.

ITALY—

Economia—

December, 1938—Indagini sulle recenti tendenze della natalità nell'Italia settentrionale: *Livio Livi*. La diminuzione delle nascite nell'intervallo tra gli ultimi due censimenti della popolazione (1931-36): *Guglielmo Tagliacarne*.

January, 1939—La crisi della sterlina: *Luigi Fabbrini*. Nuovo contributo allo studio della distribuzione dei redditi in funzione dell'età dei redditi: *Silvio Golzio*.

February, 1939—Alcune induzioni sulla realtà economica dell'autarchia: *Manlio Resta*.

JAPAN—

Kyoto University Economic Review, January, 1939—The agricultural policy in war-time, with special reference to the maintenance and expansion of agricultural productivity: *Professor Y. Yagi*.

POLAND—

Baltic and Scandinavian Countries, January, 1939—Co-operation and competition in the north: *Hjalmar G. Procope*.

SWEDEN—

Ekonomisk Tidskrift—

PARTS 3-4, 1938—Spridda studier rörande de nationalekonomiska sammanhangen: *David Davidson*.

PARTS 5-6, 1938—"Världskonjunktur" och penningpolitik: *Per Jacobsson*.

Skandinaviska Banken Aktiebolag, January, 1939—The pound and the dollar: *Professor Gustav Cassel*. The Swedish sulphate pulp industry, its development and present position in the world competition: *Erland Waldenström*.

SWITZERLAND—

Journal de Statistique et Revue Économique Suisse, Part IV, 1938—
 Feststellungen zur Wirtschaftlichkeit des Gütertransportes
 auf der Strasse durch Motorfahrzeuge: *Erwin Steiner*.
 Der Kampf gegen die Phosphornekrose in den Zündholz-
 fabriken der Schweiz: eine geschichtliche Erinnerung:
H. Wegmann. Geburtenrückgang, Kinderzahl und Lebens-
 haltung: *J. Rosen*.

INTERNATIONAL—

*Metron, No. 3, 1938—*Contributi alla teoria delle medie, II: *R. Cisciani*. Sulle proprietà delle medie potenziate e combinate: *C. Gini* e *G. Zappa*. The use of cumulative graphs for estimation of means, higher moments, etc.: *D. T. Sawkins*. The probability that the standard deviation of a second sample will differ from the standard deviation of a first sample by a certain multiple of the first sample: *G. A. Baker*. Gli esodi in Italia durante la guerra mondiale (1915–1918): *G. Pietra*. Bevölkerungsprobleme Palästinas: *H. Mühsam*.

International Labour Review—

*February, 1939—*The administration of minimum wage laws in the United States: *Ethel M. Johnson*.

*March, 1939—*Population and social problems. Wage theory and wage policy: *Paul H. Douglas*.

International Review of Agriculture—

*December, 1938—*The social income of agriculture in Europe: *J. Deslarzes*. Land reclamation and improvement in Europe (concluded): *G. Costanzo*.

*January, 1939—*Changes in the export of agricultural products from Yugoslavia: *Dr. O. v. Franges*.

LIST OF ADDITIONS TO THE LIBRARY

Since the issue of Part I, 1939, the Society has received the publications enumerated below :—

I.—OFFICIAL PUBLICATIONS.

(a) United Kingdom.

- General Register Office, Northern Ireland.* Census of Population, 1937. Counties: Antrim. xxii + 39 pp. Armagh. xxii + 27 pp. Down. xxii + 42 pp. Fermanagh. xxii + 21 pp. Tyrone. xxi + 32 pp. County and County Borough of Londonderry. xxiv + 37 pp. 6 vols. 2s. 6d. each. Belfast: H.M.S.O., 1938. $13\frac{1}{2}" \times 8\frac{1}{2}"$.
- Health, Ministry of.* Reports on public health and medical subjects: 87. Studies on the cultivation of vaccinia on the chorio-allantoic membranes of chick embryos. *W. D. H. Stevenson and G. G. Butler.* 185 pp. 4s. 89. Cancer: an inquiry into the extent to which patients receive treatment. *Sholto Mackenzie.* 41 pp. 9d. London: H.M.S.O., 1939. $9\frac{3}{4}" \times 6"$.
- Imperial Economic Committee—*
 Dairy produce: a summary of figures of production and trade. 83 pp.
 Vegetable oils and oilseeds: a summary of figures of production, trade and consumption. 116 pp.
 [London: H.M.S.O., 1938. $9\frac{3}{4}" \times 7\frac{1}{4}"$. 2s. 6d.]
- Imperial Institute.* Reports on the mineral industry of the British Empire and foreign countries. Manganese. By *A. W. Groves.* 2nd. ed. London: the Institute, 1938. $9\frac{3}{4}" \times 6"$. 164 pp. 3s. 6d.
- Labour, Ministry of.* Schedule of reserved occupations (provisional). London: H.M.S.O., 1939. Cmd. 5926. $9\frac{3}{4}" \times 6"$. 32 pp. 3d.
- Overseas Trade, Department of.* Reports: 720. El Salvador, Oct. 1938. 28 pp. 721. Colombia, 1938. 33 pp. 722. Ecuador, 1938. 40 pp. London: H.M.S.O., 1939. $9\frac{3}{4}" \times 6"$. 9d. each.
- Trade, Board of.* Report of the Joint Committee of Enquiry into the Anglo-Argentine Meat Trade. London: H.M.S.O., 1938. $9\frac{3}{4}" \times 6"$. 137 pp. 2s. 6d.

(b) British Empire.

India—

- Bombay (Province) Labour Office.* General wage census Part II. Seasonal factories. Report of an enquiry into wages, hours of work and conditions of employment. . . . 1936. Bombay, 1939. $9\frac{1}{2}" \times 6"$. 88 pp. 6d.

Palestine—

- Blue Book 1937. Jerusalem, 1938. $13\frac{1}{2}" \times 9\frac{1}{2}"$. iv + 453 pp. 400 mils.

Southern Rhodesia—

- Statistics, Department of.* Statistical year book. . . . 1938. Salisbury, 1938. $9\frac{1}{2}" \times 6"$. xiv + 166 pp.

Union of South Africa—

- Customs and Excise, Department of.* Trade statistics, year 1937. Classification on an international basis. Pretoria, 1938. $13" \times 8"$. 28 pp.

(c) Foreign Countries.

Argentina—

Dirección General de Estadística. La población y el movimiento demográfico de la Republica Argentina en los años 1937 y 1936 y síntesis de años anteriores. Buenos Aires, 1938. $9\frac{1}{2}'' \times 6\frac{1}{2}''$. 96 pp.

Santa Fé, Provincia de. Dirección General de Estadística. Significación de un barometro bancario. Santa Fé, 1938. $14'' \times 10''$. 57 pp.

Czechoslovakia—

Statistisches Staatsamt. Gewerbliche Betriebszählung in der Čechoslovaki-schen Republik nach dem Stande vom 27 Mai 1930. II Teil, Abteilung 4. Prague, 1936. $12\frac{1}{4}'' \times 9''$. xvi + 135 pp.

Denmark—

Det Statistiske Departement—

Børneskolen i Åarene 1932–1936, $9\frac{1}{4}'' \times 5\frac{1}{4}''$. 83 pp.

Erhvervstaellingen 1935. $11\frac{1}{2}'' \times 9\frac{1}{4}''$. 375 pp.

Landbrugets Gaeldsforhold 1937. $9\frac{1}{4}'' \times 5\frac{1}{4}''$. 285 pp.

[Copenhagen, 1939.]

France—

Direction de la Statistique Générale. Résultats statistiques du recensement général de la population. . . . 1936. Tome I, partie 1. Paris, 1938. $10\frac{1}{2}'' \times 8\frac{1}{2}''$. 114 pp.

Germany—

Reichversicherungsamt. Die deutsche Sozialversicherung 1937 mit einem Blick auf das Jahr 1938. Berlin, 1939. $11\frac{1}{2}'' \times 8\frac{1}{4}''$. viii + 332 pp.

Hungary—

K. Ungarisches Statistisches Zentralamt. Stand der Eisenbahnen Ungarns im Jahre 1937. Budapest, 1938. $10\frac{1}{2}'' \times 7\frac{1}{2}''$. 121 pp.

Latvia—

Bureau de Statistique de l'Etat. Margers Skujenieks. Latvijas statistikas, atlass. Riga, 1938. $10'' \times 14''$. xvi pp. + 63 plates + 65 pp.

Poland—

Office Central de Statistique. Statistique de l'assiette de l'impôt industriel 1935. Warsaw, 1938. $11\frac{1}{2}'' \times 8''$. 77 pp.

Sweden—

K. Skolöverstyrelsen. Det högre skolväsendet Läsaret 1935–1936. Stockholm, 1939. $9\frac{1}{2}'' \times 6\frac{1}{2}''$. 167 + 104 pp.

Statistiska Centralbyrån. Folkräkningen den 31 december 1930, IX. Stockholm, 1939. $8\frac{1}{2}'' \times 6\frac{1}{4}''$. xiii + 96 + 150 pp. + 1 map.

— Särskilda folkräkningen 1935–36. IV. Stockholm, 1938. $9\frac{1}{2}'' \times 6\frac{1}{2}''$. x + 82 + 101 pp. + 1 map.

United States—

Agriculture, Department of—

The regulation of milk marketing in England and Wales. By L. J. Steck. 75 pp.

Miscellaneous publications: 281. A selected bibliography on management of Western Ranges livestock, and wild life. 468 pp. 45c. 284. Bibliography on land utilization 1918–36. 1508 pp. \$1.50.

[Washington, 1938. $9'' \times 6''$.]

(c) **Foreign Countries—Contd.**

- Congress. Message from the President . . . transmitting a report of the Central Statistical Board on the returns made by the public to the Federal Government. Washington, 1939. 9" × 6". 37 pp.*
- Foreign and Domestic Commerce, Bureau of. Survey of current business, 1938 supplement. Washington, 1938. 11½" × 9". 217 pp.*
- Women's Bureau. Bulletins: 156. State labour laws for women. Part I. Summary. Part II. Analysis of hour laws for women workers. By Florence P. Smith. 158. Unattached women on relief in Chicago, 1937. vi + 84 pp. Washington, 1938. 9" × 6".*
- New York State. State Tax Commission. Income Tax Bureau. Personal income tax regulations 38: with appendix containing Article XVI of Tax Law corrected to Dec. 1, 1938. Albany, N.Y., 1939. 9" × 5½". 248 pp.*

(d) **International.****International Labour Office—****Studies and reports—**

- A. No. 41. Industrial labour in India. 1938. viii + 335 pp. 7s. 6d.
- F. 2. No. 8. Safety in the construction and use of lifts. 1939. vii + 197 pp. 6s.
- M. No. 13. Economical administration of health insurance benefits. 1938. vii + 332 pp. 7s.

[Geneva (London: P. S. King). 9½" × 6½".]

League of Nations—

- Economic and Financial Section. Statistical testing of business-cycle theories. I. A method and its application to investment activity. By J. Tinbergen. Geneva (London: Allen and Unwin), 1939. 9½" × 6½". 164 pp.*

II. AUTHORS AND MISCELLANEOUS.

- Actuarial Society of America and the Association of Life Insurance Medical Directors. Impairment study 1938. New York, 1939. 10½" × 8½". 43 pp. (From the Joint Committee on Mortality.)
- Ashton (T. S.). Economic and social investigations in Manchester 1833-1933: a centenary history of the Manchester Statistical Society . . . and an index of reports and papers of the Society. London: P. S. King, 1934. 8½" × 5½". xii + 179 pp. 5s. (From Mr. H. A. Peace.)*
- Bank für deutsche Industrie-Obligationen. Entschuldung der Ostdeutschen Landwirtschaft im Auftrag der Bank . . . Bearbeitet von Leo Drescher. Berlin, 1938. 11½" × 8½". xviii + 88 + 96 pp. (From the Bank.)*
- Barfod (Borge). Local economic effects of a large-scale industrial undertaking. Published by the Economic Research Department of Aarhus Oliefabrik A/S Denmark. Copenhagen: Einar Munksgaard (London: H. Milford), 1938. 8" × 5½". 74 pp. 3s. 6d.*
- Barnett House, Oxford. Survey Committee. A survey of the social services in the Oxford district. 1. Economics and government of a changing area. London: Oxford University Press, 1938. 8½" × 5½". xii + 379 pp. 15s.*
- Battaglia (F.) and Bertolino (A.). Problemi metodologici nella storia delle dottrine politiche ed economiche. Roma: Società Editrice del "Foro Italiano," 1939. 9½" × 7". 207 pp.*
- Beales (H. L.) and Lambert (R. S.). Memoirs of the unemployed: . . . with appendices on how the workless spend their money and on the psychology of the unemployed from the medical point of view. London: Gollancz, 1934. 7½" × 4½". 287 pp. (From Mr. H. A. Peace.)*
- Beckerath (U. v.). Über Chr. Cramp's versicherungsmathematische Arbeiten und seine Formel zur Darstellung der Sterblichkeit nebst einigen Bemerkungen über die Bestätigung seiner Ansichten durch neuere Untersuchungen. Uppsala: Skandinavisk Aktuarietidskrift, 1938. Pp. 145-156. 9" × 6". (From the author.)*

II.—Authors and Miscellaneous—Contd.

- Bernonville (Léo Dugé de)*. Initiation à l'analyse statistique. Paris: Librairie Générale de Droit et de Jurisprudence, 1939. 9" × 6". 232 pp. 50 fr.
- Bibliothèque Polonaise de Paris*. Centre d'Études Polonaises. Séances et travaux. Année 1935. 218 pp. Année 1935-36. 159 pp. Paris: Librairie Polonaise, 1935-1937. 9½" × 6½". 2 vols.
- *La Pologne et la Prusse Orientale: conférences faites à la Bibliothèque* . . . par MM. J. Ancel, E. Driault, H. de Montfort, G. Pagès et L. Tesnière . . . Paris: Gebethner et Wolff, 1933. 10" × 6½". viii + 262 pp. 4 maps. 30 fr.
- Biljon (F. J. van)*. State interference in South Africa. London: P. S. King, 1939. 8½" × 5½". x + 322 pp. 15s.
- Bloomberg (Lawrence N.)*. The investment value of goodwill. Baltimore: Johns Hopkins Press, 1938. 9½" × 6½". 70 pp.
- Bourne (J. B.)*. The importance and use of appropriate assumed means in collating field experimental results statistically. Trinidad: reprint from *Tropical Agriculture*, Vol. XV, No. 11, pp. 247-258, 1938. 10½" × 8½".
- Bowley (Arthur L.)*. The average and the individual. Sidney Ball lecture. . . . 1938. London: Oxford University Press, 1939. 8½" × 5½". 20 pp. 1s.
- Brüschweiler (Carl)*. Beruf und Konfession in der Schweiz. Olten: Otto Walter, 1938. 9½" × 6½". 27 pp.
- Campion (H.)*. Public and private property in Great Britain. London: Oxford University Press, 1939. 8½" × 5½". xvii + 138 pp. 8s. 6d.
- Cheseman (E. A.)*. The effect of the war years upon mortality in childhood. Reprint from *Human Biology*, December 1938, pp. 537-546. 9½" × 6". (From the author.)
- *Martin (W. J.) and Russell (W. T.)*. Disease and environment. Reprint from *Biometrika*, January 1939, pp. 341-362. 10½" × 7½".
- Chiao (C. M.), Thompson (W. S.) and Chen (D. T.)*. An experiment in the registration of vital statistics in China. Oxford, Ohio: Scripps Foundation for Research in Population Problems, 1938. 8½" × 7". 6 + 115 pp. \$1.
- Cochran (W. G.)*. An extension of Gold's method of examining the apparent persistence of one type of weather. Reprint from *Quarterly Journal of the Royal Meteorological Society*, October 1938, pp. 631-634. 9½" × 6".
- Cohn (B.)*. Tables of addition and subtraction logarithms with six decimals. 2nd ed. London: Scientific Computing Service Ltd., 1939. 9½" × 6". viii + 63 pp. 10s.
- Congrès International de la Population, Paris 1937. IV. Démographie statistique, études spéciales. État de la population, migrations. V. Démographie statistique, études spéciales. Natalité, nuptialité, mortalité. VII. Facteurs et conséquences de l'évolution démographique. VIII. Problèmes qualitatifs de la population. Paris: Hermann, 1938. 10" × 6½". 4 vols.
- Coon (Horace)*. Money to burn: what the great American philanthropic foundations do with their money. New York and London: Longmans Green, 1938. 8½" × 5½". 252 pp. 15s.
- Corn Trade News*. George Broomhall's corn trade news 1888-1938 golden jubilee. Souvenir number. Liverpool, 1938. 12" × 8½". 112 pp. (From Mr. G. P. Broomhall.)
- Deprez (Frédéric)*. Tables for calculating, by machine, logarithms to 13 places of decimals followed by two auxiliary tables intended to facilitate financial mathematical calculations for 3550 rates of interest. Bern: A. Francke, 1939. 9½" × 7". xv + 166 pp. 25 Sw. Fr.
- Deutscher Verein für Versicherungs-Wissenschaft*. Veröffentlichung, Heft 63. Beiträge zur Pensionsversicherung im Deutschen Reich. . . . Berlin: E. S. Mittler, 1939. 9½" × 6½". 125 pp. Rm. 2-50.
- Fabricant (Solomon)*. Capital consumption and adjustment. New York: National Bureau of Economic Research (London: Macmillan), 1938. 9" × 6". xx + 271 pp. 12s.
- Faculty of Actuaries in Scotland*. Yearbook, session 1938-1939. Edinburgh, 1938. 8½" × 5½". 122 pp. 2s. 6d.
- Garrigou-Lagrange (André)*. Production agricole et économie rurale. Paris: Librairie Générale de Droit et de Jurisprudence, 1939. 9" × 6". 211 pp. 40 fr.

II.—Authors and Miscellaneous—Contd.

- Giornale degli Economisti. Indice cinquantennale . . . (1886-1937) compresa anche la serie Padovana (1875-1878) compilato da *E.S.L.* Parte prima. Indice alfabetico per autori degli articoli ed altri contributi originali. Città di Castello, 1938. 10" × 7". 217 pp.
- Greenwood (Major) and Irwin (J. O.)*. The biostatistics of senility. Reprint from *Human Biology*, February 1939, pp. 1-23. 9½" × 6". (From the authors.)
- Hicks (J. R.)*. Value and capital: an inquiry into some fundamental principles of economic theory. Oxford: Clarendon Press, 1939. 8½" × 5½". xi + 331 pp. 12s. 6d.
- Hiskett (W. R.) and Franklin (J. A.)*. Searchlight on social credit. . . . London: P. S. King, 1939. 8½" × 5½". x + 173 pp. 8s. 6d.
- Indian Statistical Institute. Proceedings of the first session of the Indian statistical conference . . . , Calcutta, January, 1938. Calcutta: Statistical Publishing Society (London: P. S. King), 1938. 11½" × 8½". 311 pp.
- Innes (John W.)*. Class fertility trends in England and Wales 1876-1934. Princeton, N.J.: University Press, 1938. 9" × 6". xv + 152 pp. \$2.50.
- Institut für Konjunkturforschung. Schrift des Instituts, Sonderheft 47. Die Versandgeschäfte in Deutschland. Von *R. Nieschlag*. Berlin, 1939. 9" × 6". 111 pp.
- Institut des Problèmes Sociaux, Warsaw. Les jeunes gens sur le marché du travail. Warsaw, 1938. 9½" × 7½". xvi + 180 + 88 pp.
- International Conference of Agricultural Economists. Proceedings of the fifth International Conference . . . , Macdonald College, Canada, 1938. London: Oxford University Press, 1939. 9" × 6". xiv + 436 pp. 17s. 6d.
- International Statistical Institute, Bulletins. Tome XXIX, Livr. 1. Session d'Athènes 1936. Athens. 273 pp. Tome XXX, Livr. 2. Session de Prague 1938. The Hague. 267 pp. 3 fl. 1938. 10½" × 7".
- Kalecki (Michal)*. Essays in the theory of economic fluctuations. London: Allen and Unwin, 1939. 7½" × 4½". 154 pp. 6s.
- Kendall (M. G.)*, *Kendall (Sheila F. H.)* and *Babington-Smith (B.)*. The distribution of Spearman's coefficient of rank correlation in a universe in which all rankings occur an equal number of times. Reprint from *Biometrika*, January, 1939, pp. 251-273. 10½" × 7½". (From Mr. Kendall.)
- Kulp (C. A.)*. Social insurance coordination: an analysis of German and British organization . . . Washington: Committee on Social Security, Social Science Research Council (London: Oxford University Press), 1938. 9" × 6". xiv + 333 pp. 12s. 6d.
- Laufenburger (Henry)*. L'intervention de l'état en matière économique. Paris: Librairie Générale de Droit et de Jurisprudence, 1939. 9" × 6". 371 pp. 70 fr.
- McCurdy (Rt. Hon. C. A.) and Thorne (A. C.)*. Insurance shares 1887-1937 . . . together with an actuarial examination of the net yield on the shares of 28 insurance companies during the years 1921-1936. . . . London: Trust of Insurance Shares Ltd., 1938. 9½" × 7½". 16 pp. 2s.
- McGregor (A. Grant)*. The barriers to Liberalism must be removed. . . . Edinburgh: Scottish Liberal "Right Wages" Committee, 1939. 8½" × 5½". 32 pp. 6d.
- McMullen (L.) and Pearson (E. S.)*. William Sealy Gosset 1876-1937. . . . Reprint from *Biometrika*, January 1939, pp. 205-250. 10½" × 7½". (From Professor E. S. Pearson.)
- Milk Marketing Board. Milk marketing scheme: five years' review 1933-1938. London: the Board, 1939. 11" × 8½". 59 pp. (From the Board.)
- Mises (Richard von)*. Probability, statistics, and truth. Translated by *J. Neyman, D. Sholl, and E. Rabinowitsch*. London, etc.: William Hodge, 1939. 8½" × 5½". xvi + 323 pp. 12s. 6d.
- Mosé (Robert)*. L'économie collectiviste. Paris: Librairie Générale de Droit et de Jurisprudence, 1939. 9" × 6". 210 pp. 40 fr.
- Myrdal (Gunnar) and Wickzell (Sven)*. Utsikterna i fraga om den framtida befolkningsutvecklingen i Sverige och de ekonomiska verkningarna av olika alternativt möjliga befolkningsutvecklingar. Stockholm, 1938. 9½" × 6½". 44 pp. (From the Statistical Institute, Lund.)

II.—Authors and Miscellaneous—Contd.

- Myslivec (Vaclav)*. Dědičnost délky lidského života. 40 pp.
 — Paretova exponenciální funkce a její použití při racionelním výpočtu sazeb v automobilním pojištění. 20 pp.
 [Prague, 1938. 9" × 6". (From the author.)]
 — Šetření o stabilitě pojistných souborů. Prague, 1939. 9½" × 6½". 14 pp.
 (From the author.)
 National Bureau of Economic Research. Report of the committee on prices in the bituminous coal industry, prepared for the Conference on Price Research. xxi + 144 pp. 6s.
 — Studies in income and wealth, Vol. 2. By the Conference on Research in National Income and Wealth. xii + 331 + 11 pp. 14s.
 [New York: the Bureau, 1938. 9½" × 6".]
Nogaro (Bertrand). La méthode de l'économie politique. Paris: Librairie Générale de Droit et de Jurisprudence, 1939. 9" × 6". vi + 275 pp.
Pietra (Gaelano). Note in margine. La statistica italiana dell' anno XVI. Reprint from *Supplemento Statistico*, Fasc. 2, 1938. 10" × 7". 70 pp.
 (From the author.)
Quensel (Carl-Erik). Calculation of death-rates with regard to migrations. Uppsala: reprint from *Skandinavisk Aktuarietidskrift*, 1938, pp. 23-30. 9½" × 6".
 — Skilsmäsofrekvensen med särskild hänsyn till barnantalet. Stockholm, 1938. 9½" × 6½". 11 pp.
 [(From the Statistical Institute, Lund.)]
Robertson (C. J.). Agricultural regions of the North Italian plain. New York: reprint from the *Geographical Review*, October 1938, pp. 573-596. 10" × 6½".
Sandor (Sipos). Variation des conjonctures économiques. Budapest: reprint from *Magyar Statisztik Szemle*, 1938. 16 pp. 10" × 7¼". (From the author.)
Sykes (Joseph). A study in English local authority finance. London: P. S. King, 1939. 8¼" × 5½". vi + 307 pp. 12s.
Thirring (Louis). Les rapports entre les professions et la fécondité des mariages d'après une statistique hongroise. Reprint from *Journal de la Société Hongroise de Statistique*, 1938, Nos. 2-3, pp. 213-230. 9" × 6".
The Times. Gold: a reprint of the special number of *The Times*, Tuesday, June 20, 1933. London: Times Publishing Co., 1933. 8¼" × 5½". xii + 238 pp. (From Mr. H. A. Peace.)
Tout (Herbert). The standard of living in Bristol: a preliminary report of the work of the University of Bristol Social Survey. Bristol: Arrowsmith, 1938. 8¼" × 5½". 64 pp. 1s.
Warriner (Doreen). Economics of peasant farming. London: Oxford University Press, 1939. 8½" × 5½". 7 + 208 pp. illus. 12s. 6d.
Wicksell (S. D.) and Quensel (C. E.). Den äktenskapliga fruktsamheten i Sverige efter hustruns ålder och äktenskapets varaktighetstid. 39 pp.
 — Prognoser över Sveriges folkmängd under de närmaste årtiderna. 33 pp.
 — Undersökning av de demografiska elementen i deras regionala variationer och sammanhang. 79 pp.
 [Stockholm, 1938. 9½" × 6½". (From the Statistical Institute, Lund.)]
Wilson (Sir Arnold) and Levy (Professor Hermann). Workmen's compensation. Vol. 1. Social and political development. London: Oxford University Press, 1939. 9½" × 6". xxi + 328 pp. 10s.
Yates (F.) and Cochran (W. G.). The analysis of groups of experiments. Reprint from *Journal of Agricultural Science*, October 1938, pp. 556-580. 10" × 7".
Yule (G. Udny). On sentence-length as a statistical characteristic of style in prose: with application to two cases of disputed authorship. Reprint from *Biometrika*, January, 1939, pp. 363-390. 10½" × 7¼". (From the author.)

REGISTRATION OF THE UNITED KINGDOM

No. I.—ENGLAND AND WALES

A.—BIRTHS, DEATHS, and MARRIAGES : *Numbers and Annual Rates per 1,000 persons living. Deaths under 1 year of age : Mortality per 1,000 Live Births in the Calendar Years 1934–1938 and in the Quarters of those years.*

Years	1934		1935		1936		1937		1938	
Estimated Mid-Year Popln. in thousands	40,167		40,645		40,839		41,031		41,215 °	
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate
Live Births ...	597,642	14·8	598,756	14·7	605,292	14·8	610,557	14·9	621,603	15·1
Stillbirths ...	25,209	0·62	25,435	0·63	26,045	0·61	24,806	0·60	24,651	0·60
Deaths ...	476,810	11·8	477,101	11·7	493,764	12·1	509,574	12·4	478,927	11·6
Marriages ...	342,307	8·4	349,536	8·6	354,644	8·7	359,160	8·7	360,339	8·7
Infant Mortality	35,017	59	34,092	57	35,425	59	34,917	58	32,473	53
Quarters	Live Births in the Quarters of each Calendar Year									
Jan.–Mar. ...	149,396	15·0	146,363	14·6	148,035	14·6	145,105	14·4	155,269	15·3
Apr.–June ...	156,513	15·5	155,892	15·4	157,652	15·5	163,777	16·0	164,257	16·0
July–Sept. ...	149,224	14·6	155,498	15·2	155,596	15·2	158,590	15·3	158,228	15·2
Oct.–Dec. ...	142,509	14·0	141,003	13·8	144,009	14·0	142,785	13·8	143,849	13·8
	Stillbirths									
Jan.–Mar. ...	6,453	0·65	6,491	0·65	6,378	0·63	6,268	0·62	6,162	0·61
Apr.–June ...	6,637	0·66	6,620	0·65	6,502	0·64	6,619	0·65	6,632	0·65
July–Sept. ...	5,979	0·59	6,304	0·62	6,067	0·59	6,000	0·58	6,033	0·58
Oct.–Dec. ...	6,140	0·60	6,020	0·59	6,098	0·59	5,919	0·57	5,824	0·56
	Deaths (excluding Stillbirths)									
Jan.–Mar. ...	116,003	14·6	132,657	13·2	153,591	15·1	163,716	16·2	137,926	13·6
Apr.–June ...	119,007	11·8	121,955	12·0	119,540	11·8	118,525	11·6	119,177	11·6
July–Sept. ...	97,469	9·6	100,066	9·8	99,335	9·7	100,301	9·7	102,602	9·9
Oct.–Dec. ...	114,331	11·2	122,743	12·0	122,698	12·0	127,052	12·3	119,222	11·5
	Marriages									
Jan.–Mar. ...	58,744	5·9	51,441	5·2	49,884	4·9	70,700	7·0	51,906	5·1
Apr.–June ...	84,956	8·4	98,388	9·7	100,621	9·9	80,265	7·8	101,785	9·9
July–Sept. ...	109,358	10·7	110,530	10·8	115,445	11·3	121,421	11·7	116,316	11·2
Oct.–Dec. ...	89,249	8·8	89,177	8·7	88,694	8·7	86,774	8·4	90,322	8·7
	Infant Mortality									
Jan.–Mar. ...	11,600	78	9,901	68	11,947	81	10,636	73	10,523	68
Apr.–June ...	8,671	55	8,693	56	8,583	54	8,835	54	7,933	48
July–Sept. ...	6,744	45	6,884	44	6,795	44	6,795	43	6,540	41
Oct.–Dec. ...	7,770	54	8,406	60	8,100	56	8,651	61	7,477	52

Provisional.

B.—Special Town Table :—POPULATION; BIRTH-RATE and DEATH-RATE (Civilians)
in each Quarter of 1938 in certain of the 125 Great Towns.

Towns	Estimated resident population, mid-1937	Annual Rate to 1,000 Living during the thirteen weeks ending							
		April 2, 1938 (1st quarter)		June 30, 1938 (2nd quarter)		Sept. 30, 1938 (3rd quarter)		Dec. 31, 1938 (4th quarter)	
		Live Births	Deaths*	Live Births	Deaths*	Live Births	Deaths*	Live Births	Deaths*
† Great towns ...	21,221,285	15.1	13.3	15.8	11.3	15.3	9.5	13.9	11.2
<i>Including —</i>									
London (City and Met. Bs.) ...	4,094,500	14.0	13.7	14.1	11.1	13.4	9.0	12.4	10.9
West Ham C.B. ...	250,500	16.7	11.9	16.2	9.6	15.5	8.5	13.6	10.1
Croydon C.B. ...	242,300	13.8	11.8	14.9	9.8	13.5	8.4	13.2	10.2
Brighton C.B. ...	146,700	13.8	16.1	13.5	12.0	12.9	10.3	11.7	12.8
Portsmouth C.B. ...	256,200	16.0	14.5	15.0	11.7	15.2	9.9	14.1	11.6
Bristol C.B. ...	415,100	14.9	13.0	15.1	11.7	15.1	9.9	13.5	11.7
Cardiff C.B. ...	224,850	16.4	11.7	16.6	10.6	16.4	9.9	14.4	11.9
Swansea C.B. ...	161,750	15.4	13.6	16.6	11.8	15.1	10.1	14.8	11.2
Wolverhampton C.B. ...	144,000	17.4	12.6	17.9	11.9	17.9	9.1	15.8	10.7
Birmingham C.B. ...	1,629,700	16.6	12.7	17.4	11.4	17.1	9.0	16.0	10.4
Norwich C.B. ...	123,000	13.8	12.5	14.4	10.7	13.2	11.4	12.4	11.7
Leicester C.B. ...	262,900	15.8	12.6	16.2	10.7	14.2	10.0	13.7	11.0
Nottingham C.B. ...	278,800	16.4	14.8	16.5	11.8	14.6	11.1	15.1	12.0
Derby C.B. ...	130,700	14.7	12.8	15.0	11.0	14.9	9.7	13.4	11.8
Birkenhead C.B. ...	145,500	17.1	13.5	18.6	10.9	18.2	9.5	14.5	12.0
Liverpool C.B. ...	836,300	20.1	15.5	20.0	12.5	19.3	9.9	18.4	12.2
Bolton C.B. ...	170,400	13.3	14.2	13.6	12.9	14.3	11.2	12.7	13.3
Manchester C.B. ...	736,500	15.8	13.5	15.2	12.7	15.1	10.5	13.7	12.1
Salford C.B. ...	201,800	15.9	14.5	17.1	12.5	15.8	10.4	14.2	12.1
Oldham C.B. ...	127,800	13.0	15.2	13.2	14.4	13.7	11.5	12.8	14.0
Bury C.B. ...	80,670	12.0	14.9	13.9	13.3	10.5	12.1	9.6	13.2
Blackburn C.B. ...	114,000	11.7	17.2	13.1	14.1	12.4	12.3	12.5	13.6
Preston C.B. ...	113,000	15.5	15.4	17.0	12.1	15.2	10.9	13.8	12.3
Huddersfield C.B. ...	125,500	14.5	14.3	14.3	13.6	14.2	11.2	12.7	12.6
Halifax C.B. ...	97,400	13.0	15.9	13.9	12.9	14.6	11.4	12.6	14.2
Bradford C.B. ...	280,510	14.2	15.2	14.5	13.9	13.3	11.7	12.0	13.5
Leeds C.B. ...	491,880	15.7	13.7	16.3	12.5	16.1	10.8	13.9	13.1
Sheffield C.B. ...	518,200	16.5	12.7	15.8	11.4	15.7	9.6	14.8	11.3
Kingston-upon-Hull C.B. ...	310,400	18.6	13.3	20.0	12.4	17.4	10.5	17.1	12.0
Sunderland C.B. ...	182,900	19.4	14.0	21.5	12.8	19.6	10.4	16.8	12.2
Gateshead C.B. ...	117,600	19.2	15.1	16.8	11.3	20.2	10.4	18.1	12.9
Newcastle-upon-Tyne C.B. ...	290,400	16.9	13.6	17.6	12.1	16.6	11.0	15.6	12.2

* Excluding stillbirths.

† The great towns are those with populations exceeding 50,000 persons. Owing to boundary changes the numbers vary from time to time. In this table the figures relate to 125 towns for the first quarter, 126 for the second, third and fourth quarters.

No. II.—SCOTLAND

BIRTHS, DEATHS, and MARRIAGES: *Numbers and Annual Rates per 1,000 persons living. Deaths under 1 year of age: Mortality per 1,000 Live Births in the Calendar Years 1934–1938 and in the Quarters of those years.*

Years	1934		1935		1936		1937		1938	
Estimated Mid-Year Popln. in thousands	4,936		4,956		4,972		4,979		4,985	
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate
Live Births ...	88,836	18.0	87,928	17.8	88,928	17.9	87,810	17.6	88,601	17.7
Stillbirths ...	Not separately recorded									
Deaths ...	63,741	12.9	65,331	13.2	66,749	13.4	68,942	13.9	62,952	12.6
Marriages ...	36,934	7.5	37,988	7.7	37,896	7.6	38,351	7.7	38,744	7.8
Infant Mortality	6,901	7.8	6,754	7.7	7,315	8.2	7,050	8.0	6,161	7.0
Quarters	Live Births in the Quarters of each Calendar Year									
Jan.–Mar. ...	22,744	18.7	21,978	18.0	22,544	18.3	21,589	17.6	22,237	18.1
Apr.–June ...	23,247	18.9	23,259	18.8	23,594	19.1	23,864	19.2	23,999	19.3
July–Sept. ...	21,301	17.1	21,566	17.3	21,464	17.2	21,745	17.3	21,417	17.0
Oct.–Dec. ...	21,544	17.3	21,125	16.9	21,326	17.1	20,612	16.4	20,961	16.7
	Deaths (excluding Stillbirths)									
Jan.–Mar. ...	17,406	14.3	19,177	15.7	20,196	16.4	22,123	18.0	17,449	14.2
Apr.–June ...	16,730	13.6	16,205	13.1	16,214	13.1	15,781	12.7	15,605	12.6
July–Sept. ...	13,300	10.7	13,461	10.8	13,709	11.0	13,616	10.9	13,804	11.0
Oct.–Dec. ...	16,305	13.1	16,488	13.2	16,630	13.3	17,422	13.9	16,094	12.8
	Marriages									
Jan.–Mar. ...	7,692	6.3	7,695	6.3	7,731	6.3	8,093	6.6	7,891	6.4
Apr.–June ...	8,852	7.2	9,106	7.4	9,451	7.7	9,363	7.5	9,425	7.6
July–Sept. ...	10,760	8.7	11,281	9.0	11,403	9.1	11,516	9.2	11,902	9.5
Oct.–Dec. ...	9,630	7.7	9,906	7.9	9,311	7.5	9,379	7.5	9,526	7.6
	Infant Mortality									
Jan.–Mar. ...	2,097	9.2	2,111	9.6	2,441	10.8	2,104	9.7	1,790	8.0
Apr.–June ...	1,803	7.8	1,655	7.1	1,677	7.1	1,733	7.3	1,563	6.5
July–Sept. ...	1,211	5.7	1,180	5.5	1,378	6.4	1,299	6.0	1,232	5.8
Oct.–Dec. ...	1,790	8.3	1,808	8.6	1,819	8.5	1,914	9.3	1,576	7.5

No. III.—NORTHERN IRELAND

BIRTHS, DEATHS, and MARRIAGES : Numbers and Annual Rates per 1,000 persons living. Deaths under 1 year of age: Mortality per 1,000 Live Births in the Calendar Years 1934–1938 and in the Quarters of those years.

Years	1934		1935		1936		1937		1938	
Estimated Mid-Year Popln. in thousands	1,265		1,271		1,276		1,281		1,286	
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate
Live Births ...	25,365	20·1	24,742	19·5	25,909	20·3	25,412	19·8	25,743	20·0
Stillbirths ...	Not separately recorded									
Deaths ...	17,521	13·9	18,592	14·6	18,429	14·4	19,282	15·1	17,651	13·7
Marriages ...	8,230	6·51	8,844	6·96	9,144	7·17	8,623	6·64	8,587	6·68
Infant Mortality	1,767	70	2,136	86	1,992	77	1,969	77	1,927	75
Quarters	Live Births in the Quarters of each Calendar Year									
Jan.–Mar. ...	6,583	19·9	6,105	19·0	6,448	20·2	6,308	19·7	6,286	19·6
Apr.–June ...	6,865	21·5	6,510	20·2	6,793	21·3	6,917	21·6	6,902	21·5
July–Sept. ...	6,182	19·3	6,274	19·5	6,612	20·7	6,444	20·1	6,515	20·3
Oct.–Dec. ...	5,935	18·5	5,853	18·4	6,056	19·0	5,743	17·9	6,040	18·8
	Deaths (excluding Stillbirths)									
Jan.–Mar. ...	5,092	15·9	5,495	17·1	5,875	18·4	6,796	21·2	5,153	16·0
Apr.–June ...	4,606	14·4	4,753	14·8	4,481	14·0	4,514	14·1	4,283	13·3
July–Sept. ...	3,522	11·0	3,845	11·9	3,558	11·2	3,603	11·3	3,799	11·8
Oct.–Dec. ...	4,301	13·4	4,499	14·2	4,512	14·1	4,369	13·6	4,416	13·7
	Marriages									
Jan.–Mar. ...	1,199	4·7	1,532	4·9	1,725	5·4	1,790	5·6	1,599	5·0
Apr.–June ...	1,995	6·2	2,300	7·1	2,454	7·7	1,913	6·0	2,229	6·9
July–Sept. ...	2,518	7·8	2,638	8·1	2,763	8·7	2,688	8·3	2,602	8·1
Oct.–Dec. ...	2,218	6·9	2,324	7·3	2,202	6·9	2,232	6·0	2,157	6·7
	Infant Mortality									
Jan.–Mar. ...	559	88	726	119	622	96	616	98	668	106
Apr.–June ...	437	64	490	75	480	71	496	72	455	66
July–Sept. ...	371	60	478	76	401	61	370	57	368	56
Oct.–Dec. ...	397	67	435	74	487	80	482	84	436	72

No. IV.—ÉIRE

BIRTHS, DEATHS, and MARRIAGES: *Numbers and Annual Rates per 1,000 persons living. Deaths under 1 year of age: Mortality per 1,000 Live Births in the Calendar Years 1934-1938 and in the Quarters of those years.*

Years	1934		1935		1936		1937		1938	
Estimated Mid-Year Popln. in thousands	2,971		2,971		2,967		2,948		2,937	
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate
Live Births ...	57,897	19·5	58,266	19·6	58,115	19·6	56,488	19·2	56,753	19·3
Stillbirths ...	Not separately recorded									
Deaths ...	39,083	13·2	41,543	14·0	42,586	14·4	45,086	15·3	40,066	13·6
Marriages ...	14,251	4·8	14,336	4·8	11,763	5·0	14,780	5·0	14,934	5·1
Infant Mortality	3,664	63	3,988	68	4,309	74	4,121	73	375	66
Quarters	Live Births in the Quarters of each Calendar Year									
Jan.-Mar. ...	14,521	19·5	14,411	19·4	14,434	19·5	13,554	18·4	14,056	19·1
Apr.-June ...	15,009	20·2	14,919	20·1	15,100	20·4	15,052	20·4	14,612	19·9
July-Sept. ...	14,734	19·8	14,941	20·1	14,917	20·1	15,008	20·4	14,715	20·0
Oct.-Dec. ...	13,633	18·3	13,992	18·8	13,664	18·4	12,874	17·5	13,340	18·2
	Deaths (excluding Stillbirths)									
Jan.-Mar. ...	11,612	15·6	11,389	15·3	12,873	17·4	15,360	20·8	11,412	15·6
Apr.-June ...	10,025	13·5	10,947	14·7	10,821	14·6	11,206	15·2	9,812	13·4
July-Sept. ...	8,245	11·1	8,795	11·8	8,652	11·7	8,617	11·7	8,618	11·7
Oct.-Dec. ...	9,201	12·4	10,412	14·0	10,240	13·8	9,903	13·5	10,194	13·9
	Marriages									
Jan.-Mar. ...	3,271	4·4	3,857	5·2	3,796	5·1	3,303	4·5	3,617	5·2
Apr.-June ...	3,562	4·8	3,056	4·1	3,427	4·6	3,717	5·0	3,423	4·7
July-Sept. ...	4,035	5·4	4,157	5·6	4,183	5·6	4,202	5·7	4,377	6·0
Oct.-Dec. ...	3,583	4·6	3,266	4·4	3,357	4·5	3,558	4·8	3,317	4·5
	Infant Mortality									
Jan.-Mar. ...	1,169	81	1,144	79	1,234	85	1,260	91	1,144	81
Apr.-June ...	883	59	1,009	68	1,026	68	1,095	71	937	64
July-Sept. ...	827	56	948	63	893	60	863	57	802	55
Oct.-Dec. ...	785	58	887	63	1,156	85	903	69	874	66

No. V.—GREAT BRITAIN AND IRELAND

SUMMARY OF BIRTHS, DEATHS AND MARRIAGES in the years 1935-1938: *Numbers and Rates per 1,000 persons living. Deaths under 1 year of age: Mortality per 1,000 Live Births.*

(Compiled from the Quarterly Returns of the respective Registrars-General.)

	England and Wales	Scotland	Northern Ireland	United Kingdom	Ire
Area in statute acres (thousands)	37,340	9,462	3,488	50,290	17,254
1935					
Population (in thousands) ...	40,645	4,956	1,271	46,869	2,971
Births	598,756	87,928	24,742	711,426	58,266
Birth rates	14.7	17.8	19.5	15.2	19.6
Deaths	477,401	65,331	18,592	561,324	41,543
Death rates	11.7	13.2	14.6	12.0	14.0
Marriages	349,536	37,988	8,844	396,368	14,336
Marriage rates	8.6	7.7	6.9	8.5	4.8
Deaths under 1 year ...	34,092	6,754	2,136	42,982	3,988
Infant Mortality rates ...	57	77	86	60	68
1936					
Population (in thousands) ...	40,839	4,972	1,276	47,081	2,967
Births	605,292	88,928	25,909	720,129	58,115
Birth rates	14.8	17.9	20.3	15.2	19.6
Deaths	495,764	66,749	18,429	580,942	42,586
Death rates	12.1	13.4	14.4	12.3	14.4
Marriages	354,644	37,896	9,144	401,684	14,763
Marriage rates	8.7	7.6	7.17	8.5	5.0
Deaths under 1 year ...	35,425	7,315	1,992	44,732	4,309
Infant Mortality rates ...	59	82	77	62	74
1937					
Population (in thousands) ...	41,031	4,979	1,281	47,289	2,948
Births	619,850	87,812	25,412	723,779	56,488
Birth rates	14.9	17.6	19.8	15.3	19.2
Deaths	509,560	68,942	19,282	597,798	45,086
Death rates	12.4	13.9	15.1	12.6	15.3
Marriages	357,886	38,345	8,623	406,134	14,780
Marriage rates	8.7	7.7	6.64	8.6	5.0
Deaths under 1 year ...	34,917	7,050	1,969	43,931	4,121
Infant Mortality rates ...	58	80	77	61	73
1938					
Population (in thousands) ...	41,215	4,985	1,286	47,485	2,937
Births	621,603	88,604	25,743	735,950	56,753
Birth rates	15.1	17.7	20.0	15.5	19.3
Deaths	478,927	62,952	17,651	559,530	40,066
Death rates	11.6	12.6	13.7	11.8	13.6
Marriages	360,539	38,744	8,587	407,670	14,934
Marriage rates	8.7	7.8	6.68	8.6	5.1
Deaths under 1 year ...	32,473	6,161	1,927	40,561	3,757
Infant Mortality rates ...	53	70	75	55	66

Exports :—Declared value of U.K. Produce and Manufactures, and of Imported Merchandise, exported from the United Kingdom in the years ended December 31, 1936, 1937, 1938.

Countries to which consigned.	1936.		1937.		1938.	
	Exports.	Re-exports.	Exports.	Re-exports.	Exports.	Re-exports.
	£'000.	£'000.	£'000.	£'000.	£'000.	£'000.
Soviet Union	3,507	9,838	3,085	16,420	6,434	10,986
Finland	4,217	362	5,962	398	5,524	327
Sweden	10,387	910	13,021	952	11,725	1,109
Norway, including Spitzbergen	7,147	252	8,939	375	7,566	268
Denmark,* with Faroe Islands	14,943	642	16,902	667	15,783	585
Poland, including Dantzic ...	4,862	1,710	5,702	1,924	5,369	2,115
Germany	18,980	6,816	21,561	7,321	20,551	6,160
Netherlands *	12,343	1,959	15,019	2,065	13,142	1,659
Java	1,985	41	2,980	49	2,597	52
Belgium *	9,466	4,693	11,119	5,902	8,232	4,433
France *	17,752	8,034	21,410	8,623	15,131	8,209
Switzerland	3,911	1,068	4,663	1,090	3,467	790
Portugal *	2,776	354	3,068	397	2,957	271
Spain *	2,975	242	2,444	967	3,445	716
Italy *	533	408	4,942	632	5,719	443
Czechoslovakia	1,821	505	2,601	580	2,287	562
Greece	3,322	318	2,946	224	3,752	117
Roumania	1,120	45	1,814	94	1,343	54
Turkey	948	22	1,543	26	2,476	37
Egypt	7,756	183	7,879	147	8,690	179
China †	5,780	55	5,912	64	4,043	90
Japan ‡	3,564	90	4,330	397	1,803	314
United States	27,626	9,148	31,419	10,917	20,484	8,285
Cuba	1,019	14	1,410	18	849	14
Mexico	1,386	8	1,739	19	854	11
Peru	1,133	30	1,162	37	1,034	32
Chile	1,746	24	1,904	34	1,640	26
Brazil	4,759	107	7,047	157	5,195	131
Uruguay	1,920	36	2,309	41	2,188	60
Argentine Republic	15,266	274	20,043	348	19,338	377
Other Countries	28,797	1,788	34,577	2,050	32,448	1,725
<i>Total—Foreign Countries</i> ...	223,747	49,976	269,452	62,935	236,067	50,138
BRITISH POSSESSIONS.§						
Eire	21,072	4,902	21,596	5,716	20,263	5,712
British West Africa	11,393	557	14,259	764	9,301	468
Union of South Africa (incl. South West Africa Territory)	37,593	704	41,535	763	39,615	637
British East Africa	3,046	80	3,980	80	4,001	73
British India, with Burma ...	34,122	486	39,092	531	36,427	558
British Malaya	8,363	119	11,572	172	11,118	146
Ceylon and Dependencies ...	3,207	67	3,922	91	3,504	68
Australia	32,256	723	37,520	755	38,178	780
New Zealand	17,297	347	20,237	316	19,241	292
Canada	23,243	1,085	27,551	1,258	22,532	1,039
Brit. W. Indies, with Bahamas	5,230	131	6,187	163	5,991	151
Other Possessions	20,036	1,592	24,488	1,590	24,645	1,546
<i>Total—British Possessions</i> ...	216,858	10,793	251,940	12,199	234,816	11,470
Total—Foreign Countries and British Possessions	440,605	60,769	521,391	75,134	470,883	61,608

* Excluding colonies.

† Excluding Hong Kong, Macão, Manchuria, and leased territories.

‡ Including Formosa; excluding Korea and Kwantung Peninsular.

§ Including Protectorates and Mandated Territories.

Imports.—Declared value of merchandise imported into the United Kingdom in the years ended December 31, 1936, 1937, 1938.

Countries from which consigned.	1936.	1937.	1938.
	£'000.	£'000.	£'000.
Soviet Union	18,903	29,124	19,543
Finland	18,145	22,437	19,282
Sweden	20,629	26,191	24,552
Norway, including Spitzbergen	8,940	11,574	11,032
Denmark,* including Faroe Islands	33,236	36,570	37,860
Poland, including Dantzic	9,856	10,834	9,543
Germany	33,002	36,118	30,150
Netherlands *	25,089	32,010	29,341
Java	2,557	4,704	3,983
Belgium *	18,645	22,701	18,591
France *	25,623	25,626	23,638
Switzerland	6,234	7,317	7,378
Portugal *	3,856	4,312	3,668
Spain *	10,515	8,510	5,733
Italy *	2,231	7,739	7,186
Czechoslovakia	5,844	7,280	6,938
Greece	2,175	2,125	1,978
Roumania	6,233	4,533	3,827
Turkey	1,298	1,613	972
Egypt	13,543	14,334	11,636
China †	7,618	8,249	6,448
Japan ‡	9,772	11,816	9,222
United States	93,227	114,105	117,887
Cuba	5,249	4,520	4,963
Mexico	3,071	3,841	2,109
Peru	4,541	5,139	3,432
Chile	5,240	9,368	7,868
Brazil	9,844	8,460	7,705
Uruguay	3,955	4,015	3,920
Argentine Republic	45,060	59,836	38,486
Other Countries	61,259	77,599	69,824
<i>Total—Foreign Countries</i>	515,390	622,600	548,695
BRITISH POSSESSIONS.§			
Eire	20,365	21,082	22,921
British West Africa	10,336	14,214	9,334
Union of South Africa (including South West Africa Territory)	14,174	18,831	15,201
British East Africa	4,837	5,210	4,747
British India, with Burma	51,913	64,693	55,944
British Malaya	7,002	13,105	12,183
Ceylon and Dependencies	10,076	11,609	12,401
Australia	61,435	71,732	72,121
New Zealand	43,553	49,885	46,815
Canada	75,128	88,848	78,564
British W. Indies, with Bahamas	8,008	11,175	10,346
Other Possessions	25,534	34,841	31,165
<i>Total—British Possessions</i>	332,361	405,225	371,742
Total—Foreign Countries and British Possessions	847,752	1,027,824	920,438

* Excluding colonies.

† Excluding Hong Kong, Macão, Manchuria, and leased territories.

‡ Including Formosa; excluding Korea and Kwantung Peninsula.

§ Including Protectorates and Mandated Territories.

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THE SOCIAL DISTRIBUTION OF UNIVERSITY EDUCATION

By MAJOR GREENWOOD, F.R.S.

[Read before the ROYAL STATISTICAL SOCIETY, March 21st, 1939, the PRESIDENT, PROFESSOR A. L. BOWLEY, C.B.E., Sc.D., F.B.A., in the Chair.]

NEARLY five years ago I described my first impression of University statistics and what might be learned from them. Partly on account of presidential immunity, partly on account of its intrinsic demerits, my maiden effort provoked no discussion here or elsewhere. I try my luck again because one of the obstacles to discussion has been removed, although the other still faces me. No doubt my interest in the subject is mainly sentimental: I have been a University teacher for thirty-four years, and I enjoy doing sums, so it gives me pleasure to work out sums about Universities. But I try to believe that the subject *is* of importance, and shall give the grounds of my belief pride of place.

Mr. Macrosty once asked me whether there were *any* subject respecting which I could not find a relevant quotation from Walter Bagehot's writings. The answer is "hardly any," and the present subject not one of the exceptions. I suppose there are some Fellows young enough not to have read Bagehot and some old enough to have forgotten him. Bagehot's political philosophy was this.

He held that the stability of our political institutions depended on the fact that we were a deferential people, that the great majority of the nation permitted decisions to be taken by a small minority. He thought a majority of the nation were intellectually and educationally unfit to understand complicated problems but were content to be guided by those whom they regarded as superior. Bagehot was writing more than sixty years ago, and his statistical criteria of political competence were the—in those days—highly correlated

attributes—viz. rank, wealth and education. "I can conceive of nothing," he writes, "more corrupting or worse for a set of poor ignorant people than that two combinations of well-taught and rich men should constantly offer to defer to their decision, and compete for the office of executing it. *Vox populi* will be *Vox diaboli* if it is worked in that manner." I quote that passage because superficially it "dates" badly. Of the two larger political parties one now contains very few rich men. But it seems to me as true in 1939 as in 1872 that the large majority of the nation are incapable of taking political decisions, and do defer to a small minority; all that has changed is the composition of that powerful minority. It now contains a smaller proportion of merely rich or titled persons and a larger proportion of persons believed to be intellectually competent.

The essential distinction between what we call a democracy and what we call a dictatorship or a totalitarian State is not that in the former power is exercised by the many and in the latter by the few—in both power is really exercised by a very small number of people—but that in the former admission to the small group of powerful people is, in theory and to some extent in practice, open to all educated citizens. If we used words with etymological accuracy, we should not call our system a democracy, but a poor approximation to an aristocracy.

If this be a correct view of the position, the stability of our political system requires not only that admission to the controlling minority should *really* be open to all citizens fit to belong to it, but that it should be known to all that it is so open, that all who are fit have the opportunity of becoming educated citizens. At this point I must define the term "educated citizen." I understand by it what Amiel defined as an *esprit cultivé*. "Qu'est-ce qu'un esprit cultivé? C'est celui qui a traversé un grand nombre d'apprentissages de la réflexion, et qui peut regarder d'un grand nombre de points de vue" (H. F. Amiel, *Fragments d'un Journal Intime*, Vol. 2, p. 199, Paris, 1931). Perhaps this may be condensed even further into the statement that the ideal is an intelligence both broad and disciplined.

I think that the continued existence of British political institutions depends on effective power being largely in the hands of *esprits cultivés* and upon admission to the class becoming dependent *wholly* on ability.

I am not so fanatically convinced of the virtues of leather as to hold that Universities have a monopoly of the production of *esprits cultivés*; indeed, some hold that such a branch of production is a side-line in our University factories, which should be primarily

engaged in the preparation of entrants upon specific technical duties. But even those who take that view agree that the vocations for which University training should prepare are those likely to give political influence. Hence the political importance of University education is great and a study of its economic and social incidence of general interest.

In my 1934 address I went no further than to attempt to estimate the proportion of adult males which, at current rates of admission to whole-time graduating courses, would measure the extent of University education. I reached the conclusion that it was of the order of two per cent. now, and had perhaps doubled in the last century.

This limited point of view has some advantages; in the first place, when such phrases as "University education" or "University men (or women)" are used, most of us think *first* of whole-time higher education, and only afterwards of the possibilities of part-time study; in the second place, the best statistics of foreign higher education mainly relate to full-time study. But it gives a very incomplete view of the position here. In the University of London a substantial proportion of graduates, both on the "internal" and "external" sides, have never been whole-time students, and all over the country there is much higher education not leading to University graduation which, whether whole or part-time, does not come within the scope of the data I used.

In this study I shall adopt the following plan. I shall first discuss the data of whole-time higher education with particular reference to social class and such foreign experience as is available to me. I shall then briefly refer to the problem of part-time education and suggest some tentative conclusions.

The Social and Economic Distribution of University Students

Since the mediæval beginnings of University education there has never been a time when poor students have not formed a substantial part of the University population. Even in the worst period of the eighteenth century and in the Universities of Oxford and Cambridge, many poor lads obtained a University education. But it is certainly true that a century ago the children of well-to-do parents enjoyed much greater opportunities of higher education than equally intelligent children of working-class parents, and that this advantage, although substantially reduced, is still great.

So far as concerns our own country, the official statistical measurement of what may be called class bias in educational opportunity has been based on studies of the recruitment of the University popu-

lation from pupils of Public Elementary Schools. I know of no English official statistics classifying University students by parental occupation. In foreign countries this direct approach to the subject has been made, notably in Sweden, Italy and Germany.

For Sweden in 1936 Professor S. Wicksell and Dr. T. Larsson reported on the economic conditions of University students in an official publication. The enquiry, based on the sampling method, covered a wide field; the volume is, indeed, a mine of information. Here I shall refer to only one point. For the purpose of their enquiry the investigators made an occupational classification of the parents of University students. They used 8 classes, which may be roughly summarized as follows. *A* contained farmers, landed proprietors and generally persons other than manual workers who lived on the land. *B* contained teachers in Elementary Schools; *C* what we should call the professional classes and higher civil servants—*i.e.*, clergy, University teachers, medical practitioners, army officers, etc.; *D* managers or proprietors of wholesale businesses, etc.; *E* contained shopkeepers, commercial travellers, etc.; *F* employees of the higher class, such as what we should call minor civil servants, cashiers, etc.; *G* employees of a lower grade, such as foremen, non-commissioned officers and nonconformist clergy (*Frikyrkopräster*); *H* contains manual workers, including agricultural labourers. The distribution of students by parental occupation is shown for all the Universities and institutions studied, and brings out clearly the over-representation of particular classes. Thus class *C* never contributes less than 15 per cent. of the student population, in the Commercial College at Göteborg, and supplies 24.5 per cent. of the students at Lund, 30.9 per cent. of those at Upsala and 38.3 per cent. of the workers in the famous medical school of the Karolinska Institute. It is perhaps needless to say that the children of academics form a very much smaller proportion of the population at University ages than even 15 per cent. !

Professor Wicksell and Dr. Larsson wished to compare the student distribution with that of the population, but it was not practicable to use precisely the same classification. They have, however, compiled two instructive tables which I have condensed into Table I.

The second column of this table shows the percentage distribution of the population of married or widowed males aged 40 and over at the Census of 1920, the third and fourth columns the percentage distributions of parental occupations for the students of Lund and Upsala. The authors point out that, having regard to the notorious economic and social differentiation of fertility, the second column probably under-estimates the bias of the distribution; it is, however,

striking enough. Parents in the educational services, primary, secondary and University, have more than nineteen times their numerical equivalent in the student population. The non-academic but economically well-placed group of directors of businesses, wholesale dealers, etc., have more than three times their share, while at the other end of the scale manual workers have less than a quarter of the numerical representation in the Census.

TABLE I
Swedish University Data

Occupation	Percentage Distribution of Males aged 40 (Married and Widowers). Census of 1920	Percentage Distribution of Fathers of Students. 1936	
		Lund	Uppsala
Agriculture, excluding labourers ...	35.22	15.92	9.92
Education (Primary and Secondary)	0.71	13.61	13.69
Clergy of Established Church ...	0.26	6.71	7.11
Civil and Municipal Service, etc. ...	6.92	17.46	18.87
Medical	0.15	2.77	3.42
Veterinary	0.19	1.45	1.93
Officers	0.18	1.00	2.50
Engineers, Foremen, etc.	2.12	5.71	7.11
Directors of Businesses, Tradesmen	5.85	19.46	20.23
Commercial Employees, Master Mariners	1.17	4.72	4.78
Labourers, including Agricultural Labourers	47.23	11.20	10.44

For Italy we have a detailed analysis, carried out by Professor Mario de Vergottini of the Central Statistical Institute, which forms volume 13 of the series "Statistiche Intellettuali." This is based upon particulars of students during the academic year 1931-32 on the books of the Universities and Institutes of higher instruction of the kingdom, 31,570 students in Universities, 16,044 in other *Istituti Superiori*. These students are classified by occupation of parents.

With the help of my colleague, Dr. E. Lewis-Fanning, I have made a summary analysis of some of the material. The data really deserve minute analysis; it is difficult to write briefly and accurately. Thanks to the kindness of officials both of the General Register Office and of the Istituto Centrale di Statistica, I think I understand the meaning of most of the technical words used in classification, but the difficulties of comparison may be easily illustrated.

According to the Census of England and Wales of 1931, 638,709 males aged 35 years or older were employed in agriculture; of these 192,570 were farmers and 227,452 agricultural labourers, etc. In

Italy in 1931 of males of over 40, 2,827,568 were engaged in agriculture. Of these 1,231,587 were *Conducenti terreni proprii*, 308,081 *Fittavoli* and 499,523 *Coloni*. I am advised that the nearest equivalent of "farmer" is to be had by taking the sum of the three; the first group are proprietors, the two others tenants on various tenures; none could be properly described as agricultural labourers. In percentage form, farmers are 30.1 per cent. of English agricultural workers, 72 per cent. of Italian agricultural workers. The explanation is, no doubt, that under a wholly different system of farming and with different historical traditions, there are far more independent workers and fewer mere wage-earners in the occupation than in England and Wales. The result is, of course, that the social-economic status of farmers in the two countries is not the same.

TABLE II

Approximate Percentage Distributions of Certain Occupations in
 (a) *The Enumerated Population of Males aged 40 or more.*
 (b) *The Population of Fathers of University Students. Italy, 1931.*

Occupation	Population	University Population
Farmers	34.9	4.5
Agricultural Labourers... ..	9.2	0.2
Others in Agriculture	4.3	0.2
Industrial Employers, Managers, Directors ...	2.6	4.6
Clerks in Industry	0.8	0.7
Artisans	4.4	1.3
Wage-Earners	13.8	1.0
Transport Employers, Managers, Directors ...	1.2	0.3
Clerks	1.1	0.4
Wage-Earners	2.8	0.2
Commercial Employers, Managers, Directors	6.2	12.6
Clerks	1.0	1.1
Wage-Earners	0.7	0.0
Professional Occupations (excluding Clerical Staff)	1.9	33.6
Clerical Officers and Subordinates of the State or Public Bodies	2.9	12.7
Bank Clerks	0.5	1.9
Private Clerks	0.1	5.3
Persons of Independent Means	1.6	12.3
Pensioners,	3.4	4.3

I have confined myself to a mere comparison of the percentage distributions of certain occupational designations (see Table II) in the census population of males over 40 and in the parental population for University students. These do not therefore add up to 100. I have based the parental percentages not on the whole number, 31,570, but on the 26,147 for whom the parental occupation

was recorded. Only a handful of students—482—come into the category of parental profession unknown, but 4,941 are classified under “la patria potestà esercitata da un tutore.” This may not, from the economic point of view, be a random exclusion. It may contain a relatively larger proportion of wealthier families. Hence comparison is to be cautiously used.

If we take industrial employers, the commercial employers (including, no doubt, shopkeepers), the professional classes (lawyers, doctors, University professors, etc.), the functionaries of public departments, the private clerks, persons of independent means and pensioners as roughly what we used to call the black-coated classes, it will be seen that they form 18·7 of the population and 85·4 of the University population.

My colleague, Dr. Agnes Teleky, has kindly examined similar data of Switzerland for the winter semester 1935–36. It did not prove practicable to make a point-to-point comparison with census data, but the general results are similar to those discussed. Students whose parents were members of liberal professions (lawyers, doctors, clergy, engineers, etc.) formed 34·5 per cent. of the University population. Males over 40 belonging to this group formed 3·7 per cent. of the census (1930) population. Independent (*selbstständige*) occupied persons contributed 29·2 per cent. to the student and 37·2 per cent. to the occupied population. Workmen (*Arbeiter aller Art*) contributed 5·6 per cent. to the University and 38·8 per cent. to the census population.

In Germany in 1932–33 the weighting of the University population by the academic classes is shown by the fact that *Höhere Beamte* and professional men with academic training contributed 22·2 per cent. of the University population, *Arbeiter* 2·94 per cent. It did not prove easy to make comparison with census figures, but it appears that at the census of 1933, *Arbeiter* formed 40·9 per cent. of employed males aged 40 or more—i.e., their academic representation is about one-thirteenth of their census proportion.

Recent History of University Education in Europe.

It will be convenient, if not strictly relevant to my theme, to interpolate here some remarks on the recent course of education abroad. I owe to the kindness of my colleague, Dr. Agnes Teleky, a careful study of relevant data, but shall here treat the subject very briefly, because it really requires much more space than is available. I do not think it possible to make direct comparison between different countries. The kind of difficulty I have is the following. If one relates the number of students (England and Wales)

attending whole-time courses as returned in the University Grants Committee's Report to the mean population of males aged 15-25, the ratio for 1934-35 is about 9.7 per 1,000 and for 1936-37 about 9.5 per 1,000. These ratios would be increased by about 8 per cent.—say to 10.5 per 1,000—by including part-time students. This is a lower ratio than obtains for students (males) in any of the other countries studied.

But (a) the part-time students enumerated in the Government Grants Committee's Report are only a fraction of the whole number, (b) I have not sufficient local knowledge to say what portion of the students included in the foreign official returns is a strictly whole-time contingent. Hence I am not prepared either to compare our own user of higher education with that of continental countries, or to compare these among themselves. That is a task I shall hope to undertake when I have more exact knowledge. All that will be done here is to call attention to some internal movements. For *Germany* Dr. Teleky has calculated the following ratios. The *numerators* are one thousand times the numbers of students present in the Winter semester: (1) students in Universities; (2) students in all—i.e., including technical and commercial institutes. These included foreigners. The *denominators* are enumerated or estimated populations aged 15-25.

TABLE III

Academic Year	University Students		All Students	
	Males	Females	Males	Females
1910-11	8.9	0.4	11.7	0.4
1919-20	14.0	1.2	18.8	1.3
1925-26	8.2	1.1	12.9	1.2
1933-34	13.2	2.8	17.2	3.0
1934-35	11.3	2.2	14.3	2.4
1935-36	9.9	2.0	12.6	2.1
1936-37	8.0	1.6	10.5	1.7

Excluding the abnormal post-bellum peak, the maximum was in 1933-34, since when the decline has been great. But these are ratios of total populations of students to available populations.* Actually the accession rate was already declining before the change of régime. In other words, the great change is not wholly due to political doctrines. In *Holland* the change between 1930-31 and 1935-36 has been slight. The ratio for male University students

* No attention has been given to the effects of fluctuations in the birth rate upon the age constitution of the group 15-25. Hence the ratios are only quite roughly comparable.

fell from 10.3 to 10.1, for females from 2.8 to 2.5. For all students the change was even less: males in both years had a ratio of 13.7 per 1,000; for females the fall was from 2.9 to 2.7. For *Switzerland* the change between 1931-32 and 1935-36 has been a decided increase. This is true even when foreigners are excluded. The ratio (University students) has risen from 13.0 to 17.3 for males and from 2.1 to 3.2 for females. *Sweden* also shows an increase from 11.6 to 12.9 for males and from 2.2 to 3.1 for females (University students). The most remarkable figures of all relate to Italy; between 1930-31 and 1935-36 the ratio of male University students to population aged 15-25 more than doubled, it passed from 6.5 to 13.4, and that for females increased from 1.2 to 1.8. If one takes the whole number of students, the increase is less for males from 10.0 to 15.3—but still very great. Owing to changes of classification, precise comparison is (for a foreigner) difficult. But there is little doubt that the trend in Italy is just the opposite of that in Germany. So that to attribute the changes in the last-named country wholly to political re-orientation would be dangerous. As said above, the whole subject is full of pitfalls. Perhaps I may return to it when I have more knowledge.

The Class Distribution of University Education in England and Wales.

So far British investigators have contented themselves with trying to discover the proportion of pupils who began their education in Public Elementary Schools to be found among students in Universities. It is very improbable that any readers of this paper will not be British subjects, still, for the sake of a hypothetical reader, I ought, perhaps, to mention that (statistically speaking) no English parents who are wealthy and very few parents of the professional classes (lawyers, clergy, medical practitioners, civil servants of the administrative class, etc.) suffer their children to pass through the Public Elementary Schools, but prefer what are called Preparatory and Private Schools, so that the proportion sought is a measure (a rough measure) of the participation of the economically less prosperous classes in higher education.

Mr. D. V. Glass and Professor J. L. Gray (see Hogben, pp. 418 *et seq.*) concluded that about 27 per cent. of male students in Universities had passed through Public Elementary Schools. In the House of Commons on June 20th, 1938, the Parliamentary Secretary to the Board of Education (Mr. K. Lindsay) said the figure should be 42 per cent. In a subsequent discussion, in *The Schoolmaster*, Mrs. Parker, President of the National Union of Teachers, challenged Mr. Lindsay's statement and cited figures which appeared to agree

roughly with the conclusions of Glass and Gray. The controversy was acrimonious, and neither party to it seemed to be conscious of the "obvious truism"—I am quoting from the preface to the second volume of Chrystal's *Algebra*—"that one can prove no property of a function which has not been defined."

The figures of Glass and Gray were based upon tables contained in the Annual Reports of the Board of Education—e.g., Table 48 of p. 142 of Cmd. 5776, to which are appended footnotes which would lead a hardened reader of official reports to suspect that the tables are unreliable for some purposes for which they are likely to be used.* The basis of Mr. Lindsay's figure was explained in an answer to a parliamentary question given on June 30th, 1938. This is the answer:

"According to the annual returns made to the University Grants Committee, the total number of new full time entrants (male and female) to the Universities in England and Wales (excluding Oxford and Cambridge) for the academic year 1936 37 was 7,398, and of this number 3,197, or about 43 per cent., began their education in a Public Elementary School. The former figure, however, includes students from overseas who, in 1936 37, formed over 10 per cent. of the whole body of full-time students in England and Wales; if these are omitted the percentage would be 48.

"For the University of Oxford, the total number of new full-time entrants was 1,555 and for the University of Cambridge 1,952. No exact figures are available as to the number of these students who began their education in a Public Elementary School; an approximate calculation, however, gives about 350 for Oxford and 400 for Cambridge. If deduction is made of the students from overseas, the percentages of students of public elementary school origin are—Oxford 25 per cent. and Cambridge 23 per cent."

As a statistician I should naturally like to know how the approximate calculation was made, but assume for the purposes of this paper that the result is correct and applicable to both sexes indifferently, so that we may believe that 40 per cent. of male University students (whole-time students) come from the population using Public Elementary Schools and 60 per cent. from the residue. Gray and Moshinski concluded that of an estimated total school population at ages 9–12½ years, numbering 2,561,000, 2,377,000 were pupils in

* It is an interesting ethical question whether it is morally justifiable to print an accurate statistical statement which is likely to be misinterpreted. I suppose the answer depends on a preliminary reply to the question—how likely? The Board's routine table dealt explicitly with past pupils of elementary schools who passed direct from grant-aided secondary schools to the Universities. Ought an ordinary reader to reflect that not only did some elementary school pupils only enter a University after an interval, but that some never passed through a grant-aided secondary school or any secondary school? I cannot say.

elementary schools. That is, 92·8 per cent. of the children were, and 7·2 per cent. were not, educated wholly at the public cost. I see no reason to doubt the accuracy of this calculation. My colleague, Dr. E. Lewis-Faning, has attempted to check its order of magnitude along the lines of the Swedish and Italian enquiries. He took out the numbers of married males aged 35 or over in the occupied population and separately in social classes I and II of the 1931 classification. He then applied the fertility ratios derived from the 1921 enquiry so as to allow for differential class fertility. Comparing the populations weighted in this way, it appeared that if only Social Class I did not supply the Public Elementary Schools, then 98 per cent. of the school population would be in Public Elementary Schools. If Social Class II also boycotted Public Elementary Schools, the percentage would fall to 84. It is certain that, statistically speaking, Class I does not utilise the Public Elementary Schools and probable that many sub-groups of Class II prefer private schools. But I do not know how to pick out these sub-groups, and so can reach only limiting values. I have little hesitation in accepting Gray and Moshinski's 92·8 per cent.—which happens to be near the arithmetic mean of my limits, 98 and 84 per cent.

Now, if we take a to be the proportion of Public Elementary School children in the population of school children and b to be the proportion of ex-Public Elementary School children in the undergraduate population, should we expect $b = a$ if there were no class or economic bias? There are several reasons why we should not. In the first place, our actual measurements of a and b —the estimated 92·8 and 40 per cent.—relate to contemporaneous measurements, not, as they should, to the school population of several years ago from which the undergraduates of 1937-38 came, and current undergraduates. That is, I think, only a theoretical objection. It is unlikely that the figure which ought to be related to 40 per cent. would differ much from 92·8 per cent.

The next objection is that rates of mortality are lower in social classes not using than in those using Public Elementary Schools. Hence the survivors to University age will not be in the same proportions as shown by the school estimate. Here, again, a correction seems needless. Between the ages of 10 and 20 rates of mortality are at a minimum. Taking the worst and the best mortality experiences of the time—viz. County Boroughs of Northumberland and Durham and Rural Districts of East England—the national tables of 1930-32 show that according to the former, of every 1,000 males aged 10, 972 survive to 20, and according to the latter 983. A correction would be of order 1 per cent. when these *extremes* are taken, so that for general data none is needed.

The next objection is that intellectual ability is not evenly distributed through social classes so that the proportion of Public Elementary School children suitable for University education will not, or may not, be the same as in the residue. This is a much more important point which Gray and Moshinsky have elucidated. They applied the Otis Group Advanced Test to a large sample of school children, Public Elementary School children and others, expressing their results in the form of both the familiar Intelligence Quotients and as Brightness Indices. This latter index is obtained in the following way. If the standard score for a particular chronological age is 100, an individual who scores 10 points more or less than this norm is entered as of Brightness Index 110 or 90. This index has certain statistical advantages over the Intelligence Quotient. The authors found that the children of fee-paying parents did, on the average, score better than Public Elementary School children. I reproduce their table of percentile distributions.

TABLE IV

Percentile Distribution of Index of Brightness (Gray and Moshinsky)

Percentile	All Free Pupils	All Fee Paying Pupils	All Pupils with Opportunities of Higher Education	All Pupils
10	61.2	80.3	89.1	61.9
20	72.8	91.3	104.6	73.7
25	77.3	100.0	110.5	78.4
30	81.6	104.1	115.4	82.7
40	89.3	112.2	124.7	90.8
50	97.7	119.7	133.0	99.4
60	105.9	127.4	140.6	107.5
70	114.3	135.9	147.6	116.1
75	118.8	140.5	151.4	120.6
80	124.1	145.5	155.5	126.0
90	137.4	158.2	165.9	139.4

It will be seen from the second and third columns that the standard attained by 50 per cent. of the fee-payers is reached by rather less than 25 per cent. of All Free Pupils. From another table it may be deduced that the standard reached by approximately 25 per cent. of the fee-payers (I.B. greater than 140) is reached by a little more than 8 per cent. of All Free Pupils. If, then, we adopted as our criterion of intellectual suitability the standard reached by 50 per cent. of the fee-payers, we ought to weight our two populations with the coefficients 1 and 2 respectively. If we made the more stringent requirement of an upper quartile, the coefficients would be 1 and 3 approximately. Adopting the more stringent requirement, on the ground that of the pupils given opportunities for higher

(secondary school) education, 50 per cent. have an I.B. of 133 or more, the population indices of available children will not be 92.8 and 7.2, but 92.8 and 21.6. If there were no bias the proportion of Public Elementary School children in the University population should be $92.8/(92.8 + 21.6) = 81.1$ per cent. and of others 18.9 per cent. It appears that the actual distribution is 40 and 60 per cent. Ex-Public Elementary School children have not quite half, and others more than three times, their proper share of the University population.

The result reached suggests two reflections, one of which has been fully discussed by Gray and Moshinsky. As the Public Elementary School population is immensely larger than the residue, then, even with a stringent allowance for the difference of mean intellectual levels, it follows that under present conditions a large number of children of ability fit to profit from higher education do not receive it. That is a serious matter on *any* hypothesis of the function of a University education. If the primary function of University education were to produce citizens trained to think clearly, the result would be calamitous. But actually, in the opinion of many, the last-mentioned function is secondary, not primary.

The Vocational Aspect of University Education

A great University teacher said 37 years ago: "I want my son to learn what will be useful to him in his profession in life," is the statement I have heard from one parent after another. "I want my son to know how to observe and to think," is the expression of a desire which I have not yet come across" (Karl Pearson, *National Life from the Standpoint of Science*, London, 1901, p. 41). A few months ago the Parliamentary Secretary to the Board of Education in the House of Commons deprecated what he called "University education *in vacuo* quite irrespective of subsequent careers." He quoted the principal of an Egyptian College who feared that quite 25 per cent. of his students would have to end as "ordinary labourers" and reiterated, "I am not concerned with denying to anybody the advantages of a University education, which I think can be got extra-murally and in a hundred different ways, but when the public funds are paying for full-time courses, I say that there is no terrific virtue in a University education *in vacuo*. Most of the people who go to the Universities go for the specific purpose of becoming teachers, doctors, of entering the Church, or entering a variety of professions [an Hon. Member, "The Civil Service"]—the Civil Service very largely; and I have no objection to anybody going to a University, but when the State

pays, there is a definite obligation" (Hansard of June 20th, 1938, pp. 736-7).

There is, I think, no doubt that what Professor Pearson said of parents in 1901 applies to the parents of 1938 (and to their adult children, to judge from my experience of postgraduate students), and that Mr. Lindsay quite accurately stated the motives of a considerable majority of entrants to Universities. In 1935-36 just over 40 per cent. of all whole-time male students in Universities were studying medicine (including dentistry) or technology, which are primarily vocational subjects, and many students in the faculties of Arts or pure Science have made their choice for professional reasons. In my quotation from the debate in Parliament, an interjection—one of those flashes of intelligence, *rari nantes in gurgite vasto*, which sometimes illuminate the darkness of St. Stephen's—pointed to the Civil Service as vocationally connected with the Universities, and Mr. Lindsay, rightly, accepted the suggestion. An arithmetical illustration always appeals to me. Dr. E. Lewis-Faning kindly carried out a small sampling enquiry. He extracted from the current *Whitaker's Almanack*, the names of the officers holding the rank of principal assistant secretary or a higher rank in the establishments of the Ministry of Pensions, the Home Office, the War Office, the Ministry of Transport, the Treasury, the Board of Trade, the Scottish Office, the Post Office, the Ministry of Labour, the India Office, the Ministry of Health, the Foreign Office, the Board of Education, the Colonial Office, the Dominions Office, the Air Ministry, the Ministry of Agriculture and Fisheries, the Admiralty and the Cabinet Office. Of the 94 gentlemen in his sample, 42 were bred in the University of Oxford, 18 in Cambridge and 34 in some other or even in no University. We traced the academic careers of 40 of the 42 Oxford men and of the 18 Cambridge men. Of the Oxford men 31 took the School of Lit. Hum., 7 the School of Mod. History, 1 Mod. Hist. and Lit. Hum., 1 Jurisprudence and Lit. Hum. Of the Cambridge men 7 took the Classical Tripos, 5 the Mathematical Tripos, 1 each Natural Science, History or Law, 3 Mathematical and Natural Science Triposes. The sample is small, but a vocational bias of the humaner letters is indicated. Of the seven dignitaries in the War Office caught in Dr. Lewis-Faning's sample, 5 had taken Firsts in Classical "Greats."

I can easily resist the temptation the last sentence gives to quote W. S. Gilbert. Even the opportunity of making more or less well informed comments on the Civil Service Examinations does not attract me. I have no doubt that the lay-out of marks thirty to forty years ago (when most of the sample passed in) greatly favoured *literæ humaniores*, but there is, I think, an ever stronger reason for

the infrequency of scientifically trained Mandarins—the Englishman's dislike of giving things up. It is possible for a pure mathematician vocationally engaged in Whitehall to keep in touch with his subject, to do real research work. But for the chemist, the physicist or the biologist, the calm of one's study in the evening or in vacations is not enough. He needs the laboratory atmosphere. If he chooses an administrative career, he must, in the immense majority of cases, abandon hope of enlarging the boundaries of his subject.

Whether it is well for the State that the great majority of its upper servants should be destitute of scientific training; how far this evil, if it be an evil, is or may be remedied by changes in curriculum at public schools (my sample naturally relates for the most part to men whose schooldays are from thirty to forty-seven years behind them), are questions outside my scope. I merely wished to illustrate *one* vocational aspect of Universities' training. I might add that, far from being a modern innovation, the vocational aspect of a University, in the narrowest sense, is its oldest aspect. Few of the thousands who sat at the feet of the mediaeval doctors did so for the pure joy of intellectual training.

I conclude then that the primary importance of University education, so far at least as concerns whole-time University education, is, as a matter of statistical fact, vocational and, as a matter of parental and governmental philosophy, this fact is complacently accepted.

If the philosophy is right, we cannot and ought not to expect any large increase of the whole-time University population. If, to use a military metaphor popular in some educational circles, University graduates should be the commissioned officers of the nation, there must be a drastic limitation of their numbers. The only improvement of our present system suggested by recent research is to make more sure than we do that the University group is wholly recruited from the ablest youths, and that the handicap of parental poverty is reduced. Gray and Moshinski have shown that this handicap is still very great. But, in a time which gives so much encouragement to pessimism, it is surely right to remember that the handicap is less than it was a generation ago.

The vocational view of University training is not, however, approved by all students of our system. It is directly challenged by the University Grants Committee. I should like to quote *verbatim* p. 32 of the Report for 1929-30 to 1934-35 (S.O. 1936), but must content myself with a few sentences.

“It would be a great mistake if the University authorities or the students themselves were to be preoccupied solely with

the professional prospects of after-life. The objective of the best training for a vocation in life is not easily reconciled with the objective of the best training for life itself, and Universities in the course of their history have always been faced with the dilemma. . . . At the present time a special responsibility rests on the British Universities in regard to a training in life. . . . Certainly it is no part of the duty of a University to inculcate any particular philosophy of life. But it is its duty to assist its students to formulate their own philosophies of life, so that they may not go out into the world maimed and useless. . . . Are the advantages of University education to be thought of mainly in terms of the well-being of the black-coated professions? Ought not a University education to bring its own reward of an enlarged and more balanced mind even in occupations which, because they are manual, have in modern times, perhaps altogether erroneously, come to be less esteemed? "

With these views I naturally agree. Dialectically they are a complete answer to Mr. Lindsay's objection to University education *in vacuo*. But although the Committee contemplates some change of educational object, it does not, I think, envisage an enlargement of the whole-time University population.

Here I come to a point of first-rate importance. In my calculations of University population, explicitly and in some of the subsequent discussion implicitly, I have spoken of University education in the sense of whole-time instruction pursued in institutions of University rank *i.e.*, either corporations empowered to admit to degrees or colleges associated with such corporations. I have pointed out earlier why it is best to begin with this class of students; it would, however, be absurd to end with it.

Part-Time Higher Education

It is easy to show that many University students are not whole-time students. It is true that in the statistics of the Government Grants Committee such students do not account for more than about 5 per cent. of those working for a first degree, but the Committee's statistics are confined to specified institutions. Many degree students in technical colleges cannot be included and, of course, no home students. Even within the framework of the Committee's report it will be found that of London University students working for first degrees of 6,445 men, 1,067 and of 2,808 women, 322 are part-time students. Three institutions, the Birkbeck College, King's College and the London School of Economics, account for all but 27 of the men and all but 9 of the women. In other words,

virtually all these part-time students were "internal" at the University. Other "internal" part-time students are through institutions, such as technical colleges not within the ambit of the Committee's report. There remain a large portion of the University's external students, some in technical colleges, some in University colleges (Nottingham University for instance, had 311 whole-time men students and 82 part-time men students), some working at home, who are not within the ambit of the report. I have no means of compiling a complete table, but I can say that of candidates for the degree of B.A. who sat as candidates between 1931 and 1937 not less than 43 per cent. were part-time students, and of candidates for the degree of B.Sc. the same proportion.

The part-time University undergraduate population is even more substantial. It may actually amount to as much as 30 per cent. of the whole student body of the largest British University. I do not seek to go further, and enumerate part-time students doing work of a higher educational standard but not seeking University degrees; the task is almost hopeless. Some University extension courses are of a standard little if at all below that of graduating colleges; much Technical College instruction is of a general intellectual importance. But I do not know how to sort the massed data. It really needs a direct enumeration.

Here, where data are especially important, we are at a disadvantage. The importance is great for the following reasons. I do not believe that a great increase of the whole-time University population is practicable, and I think that the vocational factor of selection for entrance to whole-time University training will always predominate. The governing consideration is that the increased leisure (due to shorter working hours and better means of transit) of modern times which renders higher education possible for numbers greatly exceeding those available before, is distributed through life, not concentrated in a few years of complete leisure. I define by *leisure*, time not absorbed by the task of earning one's bread. When the school age is effectively raised, and assuming a sensible use of the two or three extra years of school-time, we should have a large population of youths aged 17 or 18 fit to profit by higher education. These youths will enjoy or waste for the rest of their lives many more hours a day than their grandparents had to make or mar. But, no more than their grandparents, will they have at disposal three or four years of complete leisure. Only those will enjoy that privilege who are fit to pursue a certain small number of vocations, vocations requiring comparatively low maximal numbers of recruits. If as many as 10 or even 20 per cent. of the rising generation are genetically fit

educated citizens, only a small minority of them can status through vocational higher education. There is a limit to the expansion of whole-time education; none (save to be educated) to the expansion of part-time education. This is why we ought to know more about part-time education from a statistical point of view than I have been able to learn. The Board of Education printed last year* a useful pamphlet on the state of our educational system. But, statistically speaking, it is very meagre. According to this report the approximate total number of persons receiving some kind of formal education after leaving school is 1,208,400. Full-time students (in Universities, training colleges, technical schools) contribute 102,400. The remainder is made up of 52,000 attendants on University extension and similar courses, 54,000 members of part-time day courses in technical schools and some 1 million members of part-time evening classes. What are these million people doing? To some the evening classes may be more than a means of escape from reality, like picture-houses and novels, to some an opportunity for acquiring technical skill having a pecuniary value and to some the basis of a self-education which is valuable, for more hardly won, than that of any whole-time University student. None of these uses is bad—I intended no sneer in the first clause of the last paragraph; to escape from reality with the magic key of science or literature is the greatest contribution to happiness which education can give—but the last-mentioned is, from a national standpoint, from the point of view of the supply of educated citizens, the most important. A statistical study of this million students would be illuminating.

I am conscious of the shortcomings of this paper. I feel that our intellectual statistics, to use the Italian official term, compare unfavourably with those of some other countries, and that we ought to have a more precise balance sheet and profit and loss account of this huge business of higher education. If I can stimulate those with the necessary knowledge to take some interest in the subject, I shall have done some good.

References

- AMIEL, H. F. *Fragments d'un Journal intime*. Paris, 1931, Vol. 2, p. 199.
 GLASS, D. V. and GRAY, J. L. *Political Arithmetic*. Edited by L. Hogben. London, 1938, p. 418.
 GRAY, J. L. and MOSHINSKY, P. *Ibid.*, p. 334.
 GREENWOOD, M. *Journ. Roy. Stat. Soc.*, Vol. XCVIII, 1935, p. 1.
 ISTITUTO CENTRALE DE STATISTICA. *Indagine sugli Studenti iscritti nelle Università e negli Istituti superiori, 1931-32*. Rome, 1936.
 WICKSELL, S. and LARSSON, T. *Utredning rörande de Svenska Universitetets och Högskolestudenternas Sociala och Ekonomiska Förhållanden*. Lund, 1936.

* *An Outline of the Structure of the Educational System in England and Wales*. S.O. 1937.

DISCUSSION ON PROFESSOR GREENWOOD'S PAPER

MR. A. M. CARR-SAUNDERS, in proposing a vote of thanks to Professor Greenwood for his contributions to the statistical study of University education this present paper being a sequel to his inaugural address in 1934 said that there was a hint in the paper that he was planning to continue his investigations. He felt that he was voicing the wish of all members of the Society, especially those engaged in Universities, when he said that he hoped Professor Greenwood would find time to press on with these enquiries. Professor Greenwood had not limited himself to the presentation of data. He had raised certain fundamental questions as to the purposes of University education. In his view it was a reflection upon the Universities that these questions were so little discussed within them at the present time. In saying that, he excluded the University Grants Committee, to which they were indebted for an interesting contribution to this problem, but in his own experience of Universities, which, though limited, had covered more than one, he had heard in hardly any Senate or equivalent academic body any discussion of these fundamental problems of the aims of University education in the modern world. To whatever cause this was to be attributed, whether to complacency or unwillingness to grapple with major issues, it was a criticism of those who were responsible for the Universities at the present time.

He hesitated to make any reference to this question, because the immediate purpose of the meetings of the Society was to deal with figures, but he was tempted to make two general observations. The first related to education for the professions in Universities. The object of such education was to render men and women more efficient for the performance of specialized functions, so that they might serve the community as doctors, engineers, and so forth. But the weakness of that education as practised to day was that, in Professor Greenwood's words, it did not produce *esprits cultivés* or intelligences both broad and disciplined. But he did believe it possible so to design educational courses as to make those who followed them educated as well as professionally efficient. Provided the time could be given, there could hardly be a more promising way of producing an intelligence both broad and disciplined than by seizing those opportunities, which occurred in the course of training recruits to the professions, for directing attention to the innumerable ways in which the technique and practice of the professions, now and in past times, were related to the world around and raised problems not only in economic and political, but also ethical issues. Yet little or no attempt was being made to use such opportunities to-day.

The second general observation he wanted to make was related to the fact that the number of those intellectually fit to profit from University education was very much larger than the number required to recruit the professions. He wished to express his personal opinion that it should be the aim of the Universities to bring all who can profit fully from University education under their care.

He thought there was a complaint to be made against the Universities that they had not made up their minds—indeed, they had hardly discussed—whether they accepted this as their ideal or not.

He had one other general point to make. He did not altogether agree with the possible interpretation of some remarks in the beginning of the paper when Professor Greenwood had spoken of "the controlling minority." Professor Greenwood implied that it is and must remain a minority because only a minority is fit for higher education, and that it is its business to control because higher education alone renders men fit to control. If by "control" was meant executive control, he agreed, but if it meant a participation in the discussions which preceded decision upon a policy, he did not altogether agree. University education was one way, but not the only way, of enabling men to understand and thereby to obtain some mastery over the world around them. In some measure the same result was achieved by the training of the hand, eye and ear, and he believed such training did fit men not so much to discuss as to adjudicate when policy had to be formulated under democracy. It was along such lines that he believed it would be possible to state a case for democracy as a workable institution because of that majority which is not fit fully to profit from University education. The section incapable of learning much by ways other than University education was relatively small.

He found it very difficult to reconcile the figures quoted by Mr. Glass and Professor Gray concerning the number of students in Universities who had passed through public elementary schools with the figures given by the Parliamentary Secretary to the Board of Education, figures which the latter had obtained from the University Grants Committee. If both figures were correct, then a relatively large number of former elementary school pupils went either to grant-aided secondary schools and then after an interval to a University, or went to the University without passing through any such secondary school. But it did not accord with his experience that the number of University students with this sort of history behind them was large. The matter was of such real importance that he thought they might press the University Grants Committee to have the facts fully examined. That Committee alone was in a position to throw light on the problem.

Professor Greenwood had noted that there were no official figures in this country classifying students according to parental occupation, but he would call attention to a paper which had not obtained as much notice as it deserved which threw some light on this matter from the figures of one University. He referred to the paper by Mr. Collin in the *Sociological Review* in 1938, dealing with the University of Glasgow. Information was obtained from the Matriculation slips for the sessions 1926-27 and 1934-35. Taking the classification used by the Registrar-General, it was found that in the period 1926-35 there was one University entrant to every twenty children born in Class I, one to every 212 children born in Class IV and one to every 550 in Class V. He carried the analysis further and found that, whereas 60 per cent. of entrants from Class I took

degrees demanding more than the minimum period of training, only 17 per cent. of Class IV entrants did so. Therefore the children of poor parents, even if they got to the University, did not profit as much as the children of rich parents, assuming that the length of the course was a measure of the profit obtained. He instituted a comparison between the period 1911-13 and the period 1926-29, and found that in general the opportunities offered to the students from the poorer class had quite definitely increased. He also found that the entrants from the richer class had been moved from the cheaper and shorter degrees to the longer and more costly degrees, and that the increased opportunities offering to the poorer students were in the courses for Arts Degrees because these lasted a shorter time and cost less money.

He desired to endorse what Professor Greenwood had said about part-time education. It was of far more importance than was generally recognized, and a great deal more ought to be known about it.

DR. E. C. RHODES seconded the vote of thanks, and then spoke of his difficulty in deciding whether Professor Greenwood really believed that the primary function of a University was vocational, and its secondary function to teach people to think. If the use of the figures derived from *Whitaker's Almanack* relating to distinguished Civil Servants were extended to bishops, it would probably be found that most of them had passed through the same school at Oxford as the distinguished Civil Servants. Whether it could be deduced that the school of *literae humaniores* provided a vocational training for bishops he did not know; it depended on what was meant by "vocational training." He had thought that vocational training was training in the particular job one was going to do; for instance during the last year or so of training medical students were doing in hospitals the kind of thing they would do later in practice. In a way he did not think that even the physicist and chemist got exactly a vocational training. They got a training in the principles of their subject which could later on be applied to particular problems.

A man who read law in a University might afterwards go to the Bar because he had some influence with solicitors which would enable him to practise the law profitably, but, on the other hand, he might go in for a commercial career in which his legal training would be useful. In the course of a University career a person spends time studying a particular subject, and he might spend time over other things, perhaps even becoming the possessor of a distinguished athletic record which might ultimately determine his career. The athletic training might then be considered as vocational.

The career of the poorer student (and that of other students too perhaps) after the University might depend partly on chance. Suppose he felt disposed to put himself to useful service as a teacher. He would probably be able to get a teaching post as a specialist, but even then his particular prospects in the teaching world must be partly conditioned by other qualities which he might or might not

have acquired at the University. Those having the disposal of jobs might want a man with whom they could live easily when they were working in their offices or schools, a man who would look at problems in the same kind of way as they did themselves, and appreciate the same kind of jokes. All students at Universities did not acquire other qualities to a like extent, and he could quite believe that the choice as between two or three reasonably capable persons might often be determined by other than technical qualities.

Reference was made to the fact that Gray and Moshinski had applied the Otis test to a large sample of school children and had computed proportions of elementary school children fit to profit by higher education. In a book called *The Nation's Intelligence*, Professor Gray, speaking of the Otis test, said that "the kind of test-measures has some relation to educability, or at least to educational experience. It ought not to be regarded as entirely free from environmental influences and merely as a test of innate intelligence (whatever that might be)." Later in the same book Professor Gray, dealing with particular classes of children who appeared to possess high intelligence quotients, said "it is reasonable to suppose some correlation to hold between the test-intelligence of parents and of their offspring." "It may be also that clerical abilities are highly correlated with whatever was measured by intelligence tests." "The children of brokers, jobbers, and financiers ranked comparatively low." "In many of the occupations ranked very high in intelligence the parents had been selected by competitive examinations." "A great gulf separates the officers' mess from the men's canteen." Yet the average I.Q. of the children of officers and private soldiers is very similar." "The figures for shopkeepers, shop managers, and shop assistants are practically identical. So are those for civil servants of every grade."

He had quoted those extracts from Professor Gray's book because he thought it was really necessary to know the basis of the measure of fitness. Possibly Professor Gray was measuring it properly but he (the speaker) always had the feeling that there was some particular quality which the intelligence test missed and which might be a determining factor in such fitness.

MRS. BARBARA WOOTTON had hoped that Professor Greenwood might be able to do something to clear up the divergence between the figures of Glass and Gray and those of the Board of Education, but they might congratulate themselves that now that the matter had been raised in the Society the chances were that the Board of Education would be put on its mettle to defend its figure of 42 per cent. A second point was this: Professor Greenwood had taken quite firmly the view that University education was to be primarily of a vocational character, and therefore he did not contemplate any substantial increase in the numbers of whole-time University students, but he did agree that there was a good deal of unrecognized ability amongst the class who at present did not easily get access to the University. He indicated the disproportionately large share that the children of the well-to-do obtained in the number of University

places available. If his estimates were to be accepted in their entirety, it followed that a practical problem arose. In the first place, admission had to be gained for the able children of the poorer classes to the University, and, secondly, if the total of University places was not to be increased, the relatively stupid children of the well-to-do who were at present occupying those places would have to be excluded. That was a simple matter of arithmetic.

One or two other things followed from the assumption that full-time University education was primarily of a vocational character. First of all, this did not necessarily limit, quite as narrowly as was usually supposed, the number of persons for whom it was proper to provide whole-time University education. The conception of the number of professionally trained people necessary for the proper conduct of communal life was limited by the particular circumstances in which we were living. The conception of the necessary number of teachers, for example, was limited by the number of children whom it was supposed one teacher ought to instruct; and it might well happen that if there were certain changes in the social environment that made a bigger demand for the professions, this again would open the field for professional University education more widely than had been contemplated.

At present a person who enjoyed a whole-time University education lived for at least three years in an environment which was what might be called middle-class. If his education was primarily non-vocational and he acquired wider interests, he was faced with the practical problem of an almost impossible adjustment on going back to a typical working-class environment. Consequently the student who went to the University from a working-class environment inevitably tried to maintain himself permanently in the middle-class environment, the pleasures of which had been opened to him during his period at the University. If the gap between those two environments were not as wide as it was now, it might be possible for the working-class student to go to the University without this psychological uprooting, and to be quite willing to regard the University as offering a non-vocational training which would be of value to him for the rest of his life. But as long as the gap was as wide as at present, it was impossible to prevent the working-class student looking upon his University experience as a vocational training.

A word about the million who went to part-time evening classes. She thought that it would be found that a very large part of the million were engaged in technical evening classes. They were trying to acquire some "professional" qualification, under the worst possible conditions as a rule—that is, when they were tired after a day's work, during time that ought to be spent in leisure, or in cultural activity. The non-vocational part of that million would be found to be a small proportion of the whole. A great number were young people of the 14-18 age-group who were pursuing quite narrow technical studies for their strictly material advancement.

All this was related to the final point, that the amount of leisure time which the citizen had to spend might easily be exaggerated. Professor Greenwood had pointed out that the citizen of to-day had

rather more hours to waste or to use profitably than his grandfather. That was partly, but not entirely, true. Some of those extra hours in big cities were taken up by travelling to and from work, so that the effective leisure had not increased to the same extent as the apparent leisure. Moreover, the leisure was cut into by a number of small duties and obligations. Recently she had had the opportunity of seeing a number of diaries collected from working-class part-time students, showing how exactly they spent their twenty-four hours. A study of these suggested that, so far as people in work were concerned, it was very easy to exaggerate the amount of leisure which even now they were able to devote to cultural studies.

MR. SHEARMAN said that there were two points which had emerged in the discussion which he desired to take up. He had noticed, like Mr. Carr-Saunders, that Professor Greenwood did not avoid qualitative questions even in a statistical paper; and Dr. Rhodes had raised a very interesting qualitative question about the figures of Glass and Gray. He had suggested that there was perhaps some particular quality which intelligence tests missed and which might be found to be the determining element in fitness for further education. On that point he was tempted to quote the famous remark of Eliza Doolittle that the difference between a flower-girl and a lady is not the way she behaves but the way she is treated, and to suggest that the qualitative differences between those who were at present highly favoured as regards higher education and those less favoured might be due to the conditions existing in the schools to which those two classes of people went.

Mrs. Wootton had referred to the size of classes, and he would like to make the only-too-familiar point that these comparisons of the intellectual standard of different classes of pupils could never be regarded as entirely satisfactory so long as the educational conditions in the elementary schools were so remote from real equality of opportunity.

The other point that occurred to him concerned the very interesting references which Professor Greenwood had made to part-time education. There was some ground for misunderstanding in Professor Greenwood's use of the term "University Extension." University Extension was a technical term, a term of art in the educational world, and the point would have been made more clearly if it had been made in the terms of something broader, such as extra-mural education, or even the more generally accepted term, adult education. He said this not in a carping spirit, but because Professor Greenwood had said that some University Extension Courses were of a standard little if at all below the graduating courses. That he accepted, but there was one feature of University Extension Courses in the narrow sense, that on the whole they tended to be rather short, whereas the feature common to all University Internal Courses was that they were prolonged over a period of years.

The University Tutorial Class did carry out into the world of adult education this particularly valuable feature of the educational work of the University; and it was that qualitative difference,

which could be traced right through the system of adult education, between the more continuous courses and the shorter and more spasmodic courses, which it was important to consider when dealing with the whole question of higher education for leisure.

The speaker went on to refer to what seemed to him to be a very important book on this question, Dr. Kotschnig's study of Unemployment in the Learned Professions. The author brought together a great deal of interesting and in some ways disturbing information from many countries of the world on University opportunity and its correlation with educational requirements. At the conclusion of that study he came back to the same point at which Professor Greenwood had arrived, that though there might be in certain directions a narrower field for the directly vocational training which Universities could give, there was likely to be a greatly widening field, if civilization developed as they hoped, for what he had called the purely cultural and largely part-time aspects of University work.

MR. M. G. KENDALL referred to Professor Greenwood's quotation from a speech by Mr. Lindsay. As the quotation stood he thought it could be read as implying that most people went up to the University with the specific intention of entering the profession which, in fact, in after life they did enter. This implication had surprised him so much that he had during the last day or two carried out a small sampling enquiry in his own Branch of the Civil Service. It related to the nineteen people who had entered the Ministry of Agriculture and Fisheries since 1925 after passing the administrative examination for the Civil Service. All these people came from Oxford or Cambridge. He was able to get hold of only seventeen of them, the other two being away on account of illness. Of the seventeen, four had gone up to the University with the intention of entering the Civil Service if they possibly could, eight had no intention whatsoever, and the other five had been in an intermediate state of mind, having considered the possibility of entering the Civil Service, but as only one of a number of other possibilities. That, as far as his experience went, was fairly typical of the Civil Service, and, from his recollection of his contemporaries, was also fairly typical of the students coming up to the universities generally. In this, of course, he always set aside that large class of people who went in for a medical career. Apart from these it seemed to him that most people going up to the University were only one stage in advance of the small boy who wants to be an engine-driver. They had ideas about a subsequent career—and it was very desirable that they should have—but it was not until they had been at the University for a year or two that their ideas began to crystallize into something definite.

He thought it might be imagined from the figures which Professor Greenwood gave regarding the ninety-four gentlemen who held the rank of Principal Assistant Secretary or a higher rank in Government establishments that the majority of people in administrative appointments had come from Oxford and read "Greats." That was true

of the higher offices of the Service as it stood at present, but Professor Greenwood had himself pointed out that those men entered the Service thirty or forty years ago, when the entrance examination was notoriously biased in favour of people from Oxford and in particular of Oxford "Greats" men.

Of the nineteen people he had just referred to who had come into his own department since 1925, ten were from Oxford and nine from Cambridge. He had asked them what subject they had read, so that he might get some comparison with Professor Greenwood's figures. There had been a strong swing away from "Greats." The administrative examination had been altered and was now, he thought, unbiased as between one type of University study and another. It might still be stupid, but it was no longer vicious in that sense. Of the seventeen people he was able to consult, five had read "Mods." and "Greats," five had read Mathematics, and the others were a miscellany of Law, Modern Greats, Modern Languages, and so on. There seemed to have been a tendency towards movement in the direction at least of more modern subjects, and, he thought, in the direction of more scientific subjects, if mathematics could be called a science.

Professor Greenwood had asked whether it was well for the State that the great majority of its upper servants should be destitute of scientific training. Mr. Kendall did not think it was correct to suggest that the majority of the upper servants in the Civil Service were thus destitute. The administrative class might be, but there was a large technical class in the Civil Service which certainly had had a scientific training. While these people were not administrative officers in the Civil Service sense, nevertheless they were called into counsel when administrative decisions were to be taken. For that reason perhaps that paragraph of the paper was open to misconstruction. However, Professor Greenwood had raised a very important question, in regard to recruitment to the Civil Service. It was a subject on which a good deal of research could be done, because all the primary data must be in the possession of the Civil Service Commission, and he hoped that someone would take up his suggestion and produce some valuable and interesting material therefrom. He wished to thank Professor Greenwood for a very interesting and instructive paper.

SIR WALTER MOBERLY said the point had been raised several times that there was a considerable gap between the figures given by Glass and Gray and those given by Mr. Lindsay in the House of Commons with regard to the proportion of ex-elementary school children at present in the Universities. Mr. Lindsay's figures were, within very narrow limits, undoubtedly right. They were gathered by the University Grants Committee directly from the Universities and from the students themselves. The Board's figures, which Mr. Glass took, were only inserted in the Board's statistical tables with the warning that they must not be taken as representing all ex-elementary school children who went to the Universities, but only those who went direct from the State-aided secondary schools. It

was true that the figure which Mr. Lindsay gave, namely, 42 per cent., included the figures for Oxford and Cambridge which had a certain element of assumption in them. But those were a very small proportion of the whole, and in all the Universities other than Oxford and Cambridge the actual figures were available.

But though the actual proportion of University students who came originally from elementary schools was not less than 40 per cent., Professor Greenwood had calculated that, even on a liberal allowance for the greater amount of ability to be expected in the more well-to-do classes, it ought in equity to have been at least 80 per cent. Hence, said Professor Greenwood, they were clearly failing to get into the Universities all the ability which was desirable. But the cogency of this argument depended on the answer to the main question raised by Professor Greenwood: what is University education for? If the chief object of going to the University was to secure a satisfactory niche in professional life, the Universities could not afford greatly to increase their present intake, and the present social distribution of students could not with advantage be fundamentally modified. On a purely vocational basis something like saturation point had been reached. On the other hand, if University education was regarded as primarily an education for life rather than for livelihood, quite a different conclusion was indicated, though time did not permit him to develop it.

THE PRESIDENT said that the point made by Dr. Rhodes with regard to vocational training opened up a technical difficulty. When a graduate attained his degree with a broad and disciplined mind and looked out for work, the only people who appeared to want such help as he could offer were the Civil Service, a section of schoolmasters, and the Church. Thus, although he might start with no particular bias in any of these directions, yet by the time he finished his courses he found that his training had in fact been vocational, the vocation of passing a particular examination or of entering on one of two professions. He was not saying this in any criticism of the Civil Service system. In the Civil Service most of the work was non-vocational, and if one passed through the Civil Service or by some other way arrived at Cabinet rank, one did not know whether one would be called on to manage H.M. Navy, or H.M. Army, the Ministry of Agriculture, or a number of other Departments. It was well therefore to start on the Civil Service with a broad and unbiased mind, sure that the technical experts would put one right as one went on.

No one had mentioned the alternate group of careers for graduates—namely, in commerce. The question of how graduates should get a broad and deep training and also be able to enter into commercial avocations to the convenience of their employers and themselves was a burning one, as Mr. Carr-Saunders knew as well as anyone else, and one at which many attempts at solution were being made at the University of London and at other Universities.

PROFESSOR GREENWOOD replied : I am grateful to those who by their contributions have supplemented or corrected what I said.

Mr. Carr-Saunders' comment on my use of the term "controlling minority" was judicious.

In one of his later papers, Bagehot wrote :—

"Though in form the political constitution of this country approaches much more nearly than it did to a democracy, as yet it makes almost no approach to a democracy in spirit. The influence of education, wealth and rank is still enormous; it is at present of no use to propose taking measures which the mass of the people might like, if sensible people see that the people ought not to like them for they will really have more bad effects than good ones" (vii. 87-8).*

That was written in 1874, and there has been some approach to a democracy in spirit in the last 65 years. On the rare occasions when it is certain that the "people" will something, good or bad, it is harder for Bagehot's "sensible people" (my "controlling minority") to baulk them than it was in 1874. But even on those rare occasions the "sensible people" have control of the executive or legislative expression of the popular will.

Dr. Rhodes will find an account of the vocational aspects of Oxford "Greats" in Bagehot, i, 138-87, especially 167 *et seq.* The vocational antithesis between administrative civil servants and bishops which he implies does not, I think, exist.

Dr. Rhodes has doubts whether Intelligence Tests are perfect measures of "pure" intelligence. Many others have also doubted (including, of course, the inventors of the tests). I have simply behaved like Bagehot's practical statesman who says :—

"Without committing myself to the tenet that $3 + 2$ make 5, though I am free to admit that the honourable member for Bradford has advanced very grave arguments in behalf of it, I think I may, with the permission of the Committee, assume that $2 + 3$ do not make 4, which will be a sufficient basis for the important proposition which I shall venture to submit on the present occasion" (v. 260).

It was a sufficient basis for *my* proposition to show that even if the test were a perfect measure of educability, it would still be true that the poorer classes get much less than their arithmetically fair share of educational opportunities.

I do not think Mr. Kendall's results conflict with mine. I know many civil servants have not only received a scientific training, but are distinguished research workers. I also believe that a great majority of administrative civil servants have no scientific knowledge, and I doubt whether an ordinary scientific education fits a young man to perform the ordinary duties of an administrative officer. There are, of course, many exceptions, but, on the whole,

* References are to Mrs. Barrington's edition of Bagehot's works, printed in 9 volumes in 1915 by Longmans.

scientific men have little skill in dialectics, and can rarely expound technical questions in a manner intelligible to Bagehot's "sensible people." The best of the "Greats" men have this power. That sometimes the lucid statement, the admirable minute, completely misses the real point, is unfortunate for the country; but I see no help for it.

I have dealt with points of controversy; they are not important. Speakers with more knowledge of the educational world than I possess, notably Mrs. Wootton and Mr. Shearman, have shown that I took too optimistic a view both of the available leisure and of the means of education at the command of young people. But their general opinions strengthen my faith. My faith is that people can be persuaded, and are being persuaded, to study not because knowledge is power, but because knowledge is *one* element of happiness. I also believe that part-time education of University standard should ultimately become a more important instrument than whole-time education.

As a result of the ballot taken during the meeting the candidates named below were elected Fellows of the Society:—

Stephen Day, B.Sc. (Econ.).
Eric George Adrian Hillesley.
Professor S. J. Lengyel.
Elia M. Shenkman, Ph.D.
Lim Gim Soo.

JUVENILE DELINQUENCY

[A Discussion before the Royal Statistical Society on April 18th, 1939, the PRESIDENT, PROFESSOR A. L. BOWLEY, C.B.E., in the Chair.]

DR. E. C. RHODES.

If one were to organize an assembly of thirty persons who profess special interest in a burning topic of the day, the solutions to the problems set would probably be worked out before the assembly dispersed. It may be that there would be thirty solutions to certain problems. Judging from newspaper correspondence, there are many solutions to the problem of juvenile delinquency, ranging from smacking to petting. In order to explain the recorded increase in juvenile delinquency, some people blame the police for changing their methods of dealing with young offenders; instead of the policeman reproving the young offender for his naughtiness and telling him to "be off home," as was formerly done, they say, he now reports him to the station sergeant, and the offender immediately becomes a unit in the collection of primary statistics. Others blame modern methods of salesmanship whereby the public, including young persons, are given open access to desirable articles of merchandise, and being tempted, fall.

As the opener of the present discussion, I feel it my duty to present certain facts relating to the subject, leaving to later speakers the task of dealing with the many other aspects with which they are more familiar. A mass of factual data is contained in the annual *Criminal Statistics* presented by the Home Office. For England and Wales, in 1935, with a population of about 41 millions, the total number of persons found guilty of offences of all kinds was 759,423. Traffic offences account for about 57 per cent. of these. The number found guilty of indictable offences (the more serious group of crimes) was 69,849, about 9 per cent. of the total. Of these, 25,543, or 37 per cent., were young persons under 17 years of age. 24,042 were males and 1,501 were females. If we regard, for our purposes, juvenile delinquency as "being found guilty of indictable offences," then juvenile delinquency appears to be practically confined to the male sex. This may be the most significant feature of the problem, and certain explanations of this sex difference may be propounded during the course of our discussion. Of the 25,543 young persons, 25,442 were dealt with in Courts of Summary Jurisdiction, the first court. Of the 44,306 adults found guilty of indictable offences, 37,580 were dealt with in the same Courts. We can get quite a considerable

amount of information from the figures relating to convictions in these Courts, and in what follows attention will be restricted to them.

We may ask to what extent crime, judging by the figures of convictions for indictable offences in Courts of Summary Jurisdiction, is evenly distributed throughout the country. The following tables give some indication of the main facts. Here "London" means the area policed by the Metropolitan Police and the City Police. "Towns" include all towns with 40,000 inhabitants or more with separate police forces, and "Counties" include the remainder. This remainder embraces all the smaller towns, and some of the larger without separate police forces - *e.g.*, Bournemouth.

Numbers found Guilty of Indictable Offences in Courts of Summary Jurisdiction

(1934, 1935 and 1936)

	Juvenile (Persons under 17 years of age)			Adult (Persons 17 years old and over)		
	1934	1935	1936	1934	1935	1936
London	3,288	4,298	5,214	8,029	8,214	8,461
Towns	8,861	10,659	11,122	13,084	13,051	13,368
Counties	8,279	10,485	10,583	16,898	16,315	16,959
England and Wales	20,428	25,442	26,919	38,011	37,580	38,788
Proportions (1934 100 in each case)						
London	100	130.7	158.6	100	102.3	105.4
Towns	100	120.2	125.5	100	99.7	102.2
Counties	100	126.7	127.8	100	96.6	100.4
England and Wales	100	124.5	131.7	100	98.9	102.0
Proportions (England and Wales 100 in each case)						
London	16.1	16.9	19.4	21.1	21.9	21.8
Towns	43.4	41.9	41.3	34.4	34.7	34.5
Counties	40.5	41.2	39.3	44.5	43.4	43.7
England and Wales	100	100	100	100	100	100

The year 1934 is taken as the starting-point because the new methods of dealing with juvenile offenders were then introduced. The changes with time in the juvenile figures contrast sharply with similar changes in the adult figures, which are relatively slight. The changes in the towns and the country (for juveniles) appear to be slight between 1935 and 1936, but substantial between 1934 and 1935. But for London, the change from 1934 to 1935 is followed by another large increase between 1935 and 1936. Some of the increase

may be attributed to changes in the age distribution of the population. The *Criminal Statistics* give the following figures for the country as a whole.

Number of Persons found Guilty of Indictable Offences per 1,000 of Population, in each Age-Group.

Ages	Male					Female				
	10-	14-	16-	21-	30-	10	14	16-	21	30
1934	0.788	0.855	0.686	0.444	0.171	0.038	0.069	0.089	0.061	0.033
1935	0.983	1.006	0.720	0.439	0.163	0.047	0.076	0.093	0.061	0.035
1936	1.051	1.053	0.767	0.446	0.168	0.059	0.068	0.093	0.064	0.036

(Note.—The figures for age-group 10- were obtained from offenders of all ages under 14 and population 10 and under 14.)

These rates show that the shifting age distribution does not account altogether for the increase in juvenile crime. In what respects did London in 1935-36 differ from the rest of the country? Was there a relatively greater increase in the juvenile population of London? Were the new methods operated with greater intensity in London than in the rest of the country?

Taking the three years together, it appears that about 40 per cent. of the juvenile offenders are in the counties, the remainder being in London and the towns, while about 44 per cent. of the adult offenders are in the counties. Juvenile crime appears to be a more urban phenomenon. Is this difference due to age differences, or to differences of opportunity, or both?

The Counties.

More detailed information is given in the following table. Here the counties are arranged in order of size according to the 1935 population. Essex, Hertford, Kent and Surrey are omitted owing to parts of these counties being included in the Metropolitan Police District. The average number of juveniles and adults convicted in the three years are related to the various populations, and for each county the percentage of the population living in urban communities is given. It must be remembered that the counties exclude towns with populations of 40,000 and over with separate police forces. The counties are disposed in five groups.

We observe that with increasing size there is an increase in the urban percentage. Also, there are increases in the proportions of juveniles and adults convicted to population. The connections between the size of the urban population, the number of juveniles

and adults convicted are indicated approximately by the formulæ :—

Urban Population (thousands) (U.) = $0.047 P^{1.220}$

Juveniles convicted (J.) = $0.166 P^{1.178}$

Adults convicted (A.) = $0.402 P^{1.112}$

P stands for population (in thousands).

Hereford, with a population of 110,600 in 1935, has 42,100 persons living in urban communities, and an average of 41 juveniles and 79 adults found guilty in Courts of Summary Jurisdiction in the three years. The formulæ give 44,100 for the urban population, 42 juveniles and 75 adults. These formulæ enable us to consider the relationships between urbanization, juvenile crime and adult crime in the counties, when the influence on them of size is eliminated. We compute for each county the figures from each formula, and express the actual figures as percentages of those so derived. Thus Norfolk, with a population of 321,400, has 63,000 living in urban communities, the formula gives 161,800. 63,000 divided by 161,800 gives an urbanization index of 39 (percentage). The actual number of juveniles in the three years is 328; the formula gives 445, from which the juvenile index is 74 (percentage). The number of adults is 617; the formula gives 740, and the adult index is 83 (percentage). Norfolk is less urban than is indicated by the aggregate of the counties, and has juvenile and adult indices less than 100. On the other hand, the figures for Monmouth are : number living in urban communities 279,900 out of a total population of 327,200; the formula gives 165,600, leading to an urbanization index of 169; number of juveniles in the three years, 684; the formula gives 454, index 151; number of adults, 1,286; the formula gives 755, index 170.

In the following table the counties are re-grouped, Group I containing those counties with urbanization indices less than 90, Group II where this index is 90-109, and Group III those counties with urbanization indices 110 and over.

Group I, with lower urbanization indices, has on the average lower juvenile and adult indices, and Group III, with higher urbanization indices, has higher juvenile and adult indices. Thus juvenile and adult crime both appear from these records to be connected with urbanization. Further, within each group there appears to be a relationship between juvenile and adult crime. Counties with roughly the same degree of urbanization and with a more than average adult index have a more than average juvenile index, and vice versa.

The extent of crime, juvenile and adult, appears to be associated with urbanization, and, in addition, there are other factors which

Counties Arranged to show Changes in Juvenile and Adult Indices with Urbanization Index.

Group I—Urban less than 90				Group II—Urban (90-100)				Group III—Urban 110 and more			
Counties	Urban		Adults	Counties	Urban		Adults	Counties	Urban		Adults
	Less than 80	More than 80			Less than 100	More than 100			Less than 100	More than 100	
Rutland	88	Radnor	101	98	81	Merioneth	...	...	112
Brecon	110	Montgomery	109	102	124	Anglesey	...	...	110
Bedford	99	Cardigan	95	76	90	Huntingdon	...	...	134
Oxford	66	Lancaster (Holland)	99	101	134	Westmorland	...	...	96
Cambridge	56	Suffolk (West)	98	76	94	Pembroke	...	...	101
Berkshire	94	Lincs (West)	95	104	106	Fifflin	...	...	107
Sussex (East)	87	Hereford	96	97	105	Caernarvon	...	...	91
Leicester	41	Derby	97	119	98	Sussex (West)	...	...	153
Norfolk	89	Yorks (E.R.)	103	79	82	Dorset	...	...	98
Gloucester	83	Carmarthen	95	137	101	Worcester	...	...	86
Somerset	82	Cumberland	90	141	109	Monmouth	...	...	170
Derby	79	Suffolk (East)	97	96	73	Warwick	...	...	109
	102	Northampton	101	86	81	Northumberland	...	...	153
Average	94	Salem	107	85	95	Nottingham	...	...	101
Number of Counties	94	Lancaster (Lancashire)	102	141	108	Southampton	...	...	106
More than 100	3	Buckingham	100	112	109	Cheshire	...	...	82
Less than 100	9	Yorks (N.R.)	100	142	109	Glamorgan	...	...	219
	Wiltshire	99	73	88	Stafford	...	...	63
	Cornwall	109	76	94	Lancashire	...	...	91
	Devon	93	62	84		...	...	...
	Durham	96	104	160	Average	...	...	114
	Yorks (W.R.)	100	94	140	Number of Counties	...	...	...
	More than 100	...	...	...
	Less than 100	...	...	...
	Average	...	...	103		...	...	...
	Number of Counties	...	...	...		...	...	...
	More than 100	...	...	11		...	...	...
	Less than 100	...	...	11		...	...	...

Number of Counties	Adult			Number of Counties	Adult			Number of Counties	Adult		
	Less than 88	More than 88			Less than 100	More than 100			Less than 106	More than 106	
Juvenile	84	Juvenile	...	...	...	Juvenile	...	...	...
Less than 80	1	Less than 100	...	...	2	Less than 123	...	...	2
More than 80	5	More than 100	...	...	9	More than 123	...	...	7

Towns Arranged According to Size, showing Juveniles and Adults Found Guilty in Courts of Summary Jurisdiction per 1,000 Population.
(Averages for 1934, 1935, 1936.)

Town	1935 Pop. (000)		3 Years Average per 1000 Population		Town	1935 Pop. (000)		3 Years Average per 1000 Population		Town	1935 Pop. (000)		3 Years Average per 1000 Population	
	Juvenile	Adult	Juvenile	Adult		Juvenile	Adult	Juvenile	Adult		Juvenile	Adult	Juvenile	Adult
Chester ...	40.5	1.38	0.96	0.79	Colchester ...	51.4	1.08	0.89	1.08	Lincoln...	64.1	0.99	0.92	0.92
Accrington ...	41.0	0.62	0.79	0.56	Worcester ...	52.7	0.54	0.54	0.53	Hastings ...	64.1	0.50	0.65	0.65
Dover ...	41.5	0.32	0.66	0.32	Dewsbury ...	53.4	0.44	0.44	0.39	Barrow ...	64.9	0.89	0.78	0.78
Scarborough ...	41.7	0.93	1.63	0.83	Larnough ...	53.4	0.83	0.83	0.78	Chesterfield ...	65.2	0.75	0.75	0.75
Bedford ...	43.4	0.60	0.83	0.60	Eastbourne ...	58.2	0.46	0.46	0.47	Certbury Lynd ...	67.4	0.64	0.64	0.64
Peterborough ...	43.1	0.44	0.72	0.44	Grimsby ...	58.3	0.98	0.98	0.97	Wymouth ...	68.2	0.45	0.45	0.45
Lancaster ...	46.5	0.44	0.58	0.44	Cardale ...	58.3	0.76	0.76	0.63	Exeter ...	68.2	0.69	0.76	0.76
Falkstone ...	46.7	0.65	0.60	0.65	Newcastle-under-Lyme ...	60.1	0.73	0.73	0.81	Doncaster ...	68.6	0.83	0.83	0.83
Ashton-under-Lyme ...	50.1	1.45	1.76	1.45	Wakefield ...	60.4	0.82	0.82	0.59	Rotherham ...	68.7	0.72	0.80	0.80
Average ...	...	0.69	0.96	...	Dudley ...	60.4	0.70	0.70	0.78	Average ...	...	0.70	1.08	1.08
Barnsley ...	71.2	0.98	1.49	0.98	Burnley ...	93.1	0.75	0.75	1.36	South Shields ...	112.0	1.34	1.34	1.34
Cambridge ...	75.4	0.84	0.73	0.84	Grimsby ...	93.9	0.94	0.94	1.18	Huddersfield ...	115.0	0.75	0.75	0.75
Bootle ...	76.5	1.99	1.47	1.99	Rochdale ...	94.1	0.67	0.67	1.26	Preston ...	116.2	0.43	0.43	0.43
Southport ...	79.3	0.80	0.80	0.80	Newport ...	94.8	1.16	1.16	1.08	Blackburn ...	118.2	0.97	1.24	1.24
Luton ...	80.0	0.39	0.73	0.39	Wallasey ...	96.6	0.36	0.36	0.89	Blackpool ...	120.2	0.62	1.54	1.54
Warrington ...	80.3	0.82	0.82	0.82	Northampton ...	96.7	0.36	0.36	0.73	Gateshead ...	121.2	1.08	0.91	0.91
Wigan ...	84.5	0.60	0.60	0.60	Halifax ...	97.1	1.21	1.21	1.13	Norwich ...	124.7	0.20	0.62	0.62
Oxford ...	84.2	0.22	0.73	0.22	Reading ...	99.6	0.35	0.35	0.63	Stockport ...	130.3	0.52	0.74	0.74
York ...	90.2	0.51	1.35	0.51	Walsall ...	106.0	0.67	0.67	0.64	Oldham ...	133.3	0.60	0.74	0.74
Ipswich ...	91.4	0.73	0.67	0.73	St. Helens ...	108.1	0.93	0.93	0.84	Salford ...	134.9	0.90	1.22	1.22
Average ...	...	0.75	0.95	...	Average ...	...	0.88	0.88	0.97	Average ...	...	0.74	0.98	0.98
Middlesbrough ...	140.0	1.35	0.92	1.35	Plymouth ...	203.6	0.75	0.75	1.11	Bristol ...	412.6	0.46	0.84	0.84
Derby ...	140.8	0.71	1.01	0.71	Salford ...	210.0	0.64	0.64	1.08	Leeds ...	437.2	0.69	1.30	1.30
Wolverhampton ...	141.4	0.46	0.66	0.46	Cardiff ...	221.4	0.83	0.83	1.11	Sheffield ...	520.5	0.40	0.84	0.84
Birmingham ...	147.8	0.43	1.22	0.43	Portsmouth ...	250.3	0.60	0.60	0.78	Manchester ...	748.1	0.89	1.53	1.53
Pirkenhead ...	149.4	0.85	0.85	0.85	Leicester ...	256.1	0.38	0.38	0.65	Liverpool ...	854.6	1.88	1.77	1.77
Swansea ...	164.8	1.03	1.50	1.03	Stoke ...	274.1	0.60	0.60	0.61	Birmingham ...	1013.7	0.73	0.76	0.76
Bolton ...	174.9	0.46	0.63	0.46	Nottingham ...	280.2	0.57	0.57	1.01	...	...	...	...	...
Southampton ...	177.2	0.77	0.97	0.77	Newcastle ...	291.0	0.59	0.59	1.15	...	...	...	...	...
Sunderland ...	185.1	0.64	0.64	0.64	Bradford ...	292.2	0.71	0.71	0.60	...	...	...	...	...
Coveyent... ..	189.0	0.60	0.61	0.60	Hull ...	321.3	0.93	0.93	1.03	...	...	...	...	...
Average ...	...	0.78	0.93	...	Average ...	...	0.66	0.66	0.91	Average ...	...	0.84	1.17	1.17

operate to increase the incidence of crime. Whatever these factors are, they affect the juvenile and adult figures in the same way.

The Towns.

In the table on p. 390 the towns are ranged according to size. Judging from the averages, mere size does not seem to have any influence on the incidence of the recorded crime considered here. But there is a correlation between the proportions of juveniles and adults found guilty for the 86 towns indicated by a correlation coefficient, 0.44. This supports the previous conclusion obtained from the county figures that juvenile and adult crime occur together.

There is also a relation between the proportion of juveniles convicted to total population and the gross reproduction rate, for the 71 county boroughs in our list, indicated by a correlation coefficient, 0.48. (The gross reproduction rates (computed for 1931) are taken from *Political Arithmetic*, edited by Lancelot Hogben). The gross reproduction rates may be used as indicators of the proportions of juveniles in the populations. The correlation between the adult figures and the gross reproduction rates is indicated by a correlation coefficient of 0.10.

We reach the not unexpected conclusion that the incidence of juvenile delinquency is greater in places where there is a larger proportion of juveniles in the population.

The link between juvenile and adult crime may be due to the operation of social and economic factors. We are able to examine these links for one such factor—unemployment. In the following table we give the rank-correlations for the towns grouped according to gross reproduction rate.

Gross Reproduction Rate		Number of Towns	Correlations		
			J.A.	J.U.	A U.
0.7 and over but less than 0.8	0.8	10	0.08	0.38	0.07
0.8 " " " 0.9	0.9	11	0.68	0.43	0.35
0.9 " " " 1.0	1.0	15	0.64	0.62	0.54
1.0 " " " 1.1	1.1	13	0.38	0.41	0.43

J—stands for Juvenile crime, proportion per 1,000 population.

A— " Adult crime, " " " " " "

U— " Average Unemployment percentage, 1935."

With towns having roughly the same proportion of juveniles, as judged by the gross reproduction rate, there is a greater incidence of both juvenile and adult crime where there is more unemployment.

Some of the differences between towns in respect of juvenile crime are due to differences in the age constitution of the populations.

Some of the differences between towns in respect of crime generally are possibly due to differences of environment. Where there is adult crime, there also is juvenile crime.

The Changes with Time.

In the following table the number of juveniles found guilty in Courts of Summary Jurisdiction in 1936 is expressed as a percentage of the corresponding number in 1934 for each town. Similar figures are given for adults and for persons prosecuted for "other non-indictable offences." These include offences against Highway Acts—*e.g.*, obstruction, driving dangerously; offences against intoxicating liquor laws—*e.g.*, drunkenness, simple and with aggravations; offences against Police Regulations—*e.g.*, allowing chimney to be on fire; offences against Bye-laws.

There are considerable variations amongst these percentages. For juveniles, the average percentage for all towns is 122. There were 21 towns for which the number in 1936 was less than that in 1934. For adults, there were 41 towns with decreases from 1934 to 1936 and the average percentage is 100. For the "Other non-indictable offences" the average percentage was 130, and only nine towns showed a decrease.

It would appear that the increase in the number of prosecutions for other non-indictable offences presented a problem as important as that of juvenile crime. The number of persons found guilty of traffic offences for England and Wales in the three years, 1934, 1935, 1936—334,071; 432,816; 488,297—and the corresponding figures for drunkenness—43,647; 47,224; 50,069—contribute largely to the circumstantial evidence in this case. Did the fact that more vehicles were in circulation during 1936 compared with 1934 mean that there were more vehicles left unattended in the streets, thus presenting greater opportunities for juveniles to risk being charged with larceny from motor cars?

Many people, while deploring the anti-social tendencies of some young persons, are inclined to lay not a little blame on the community for offering easy opportunities to the commission of offences, such as unattended vehicles, open stores, and new building estates with unguarded valuable materials.

For the smaller towns, some of the percentage figures in the above table are derived from small numbers, and great significance should not be attached to them. For the twenty larger towns ranging in size from Middlesbrough to Hull there is some connection between the change in the juvenile figures and those in the adult figures from 1934 to 1936. The correlation coefficient for the percentages is 0.35. On the average, for those towns with an increase

from 1934 to 1936 in the number of adults found guilty, there is also an increase in the number of juveniles found guilty.

In this brief survey of some of the facts relating to juvenile crime the following conclusions emerge.

(a) Juvenile crime appears to be a part of a major problem, including adult crime, which involves social and economic considerations.

(b) In order to gauge properly the differences between the incidence of juvenile crime in different parts of the country we need more exact information regarding the age-constitution of local populations.

(c) In considering changes with time, we must take account of changing environment if we are to deduce anything from the facts of recorded crime regarding changes in the naughtiness of the juvenile population.

[NOTE.—London has been omitted from consideration in the foregoing, as it requires detailed analysis, and separate figures for the various parts of London are not available in the Home Office Statistics.]

MR. C. P. HILL (of the Home Office) said that it was with some trepidation that he accepted the invitation to take part in the discussion, because he had very little claim to be considered a statistician. It was only during the last four years, since he had been in the Children's Branch of the Home Office, that he had had occasion to deal with the problem which Dr. Rhodes had tackled in the present paper. He congratulated him on the industry and skill he had brought to bear on the production of the Tables, but it was necessary to call attention to the fact that the period Dr. Rhodes had taken—namely, 1934–36—was a rather unfortunate one. It was in the nature of a transition period in the working of the Children and Young Persons Act. Dr. Rhodes had said that he started with 1934 because that was the first full year after that Act came into force. But the chief feature of the criminal statistics for that year was the meteoric rise in the number of children and young persons brought before Juvenile Courts. During the previous five years that number had remained stationary at about 30,000 annually, including both indictable and non-indictable offences. (The number charged with non-indictable offences, by the way, was almost exactly equal to the number charged with indictable.) During those five years the proportion of juveniles brought before the Court to the total population of the age group 10–16 remained constant at about 1 to 130. Immediately after the passing of the Act, however, the number of juveniles coming before the Juvenile Courts rose from 30,000 in 1933 to 43,000 in 1934, 53,000 in 1935, and 60,000 in 1936. That represented a 100 per cent. rise in a three-year period, and it

was the period of that rise which was covered by Dr. Rhodes's Tables. The surprising thing was that in 1937 the rise was not continued, the figure remaining almost stationary at about 60,000, and the same phenomenon occurred in 1938. Although the final figures for that year were not yet forthcoming, there appeared to be only a slight rise, the figure remaining at not much over 60,000.

It had been pointed out that the rise was reflected in some parts of the country but not in others. Some towns had much higher indices for 1936 than for 1934. He ventured to suggest that the reason might in part be found in the fact that in the early days of the working of the Children and Young Persons Act many education authorities, brought into the working of the Juvenile Courts for the first time in that year, did not, at the outset, realize the extent of their powers and were not operating the Act in its full range. On the other hand, some of the largest towns actually experienced a decline in juvenile delinquency during the last two years, since the peak of 1936.

He was not quite sure what Dr. Rhodes was seeking to deduce from his observations. He himself had a very practical object in view—namely, to estimate ahead the amount of accommodation required in approved schools. With that object he set on foot a similar investigation in 1934, but he thought nobody who was concerned with children and young persons could have anticipated this 100 per cent. rise in three years in the numbers coming before the Courts. The continuation of that rise over three years put all his own calculations right out of joint. If any explanation could be offered for the flattening out of the curve which was now being experienced, it would be very useful to the Home Office.

One feature mentioned by Dr. Rhodes was the sex difference among the offenders. It was true that a very much smaller proportion of girls than boys came before the Juvenile Courts. The reason very possibly was that the police and local authorities were more reluctant to bring girls before the Courts. A girl did not usually come up unless she had done something very bad, whereas not quite the same delicacy was felt by those who had charge of boys. The authorities in different parts of the country varied widely in their attitude towards the delinquent girl. Taking as an index the number of girls who were in approved schools, in his own county of Cornwall this was 2.5 for every 100,000 of the total population, but he was not prepared to deduce from that that Cornish girls were four times as bad as the girls, say, of Durham, where the index was roughly 0.67 to 100,000.

Another factor which made it difficult to collect comparative local statistics was that in some places the practice of police cautioning was widely followed—that is to say, when an offence was reported by the constable, the police superintendent, instead of taking the case to the Courts, brought the offender to his office and administered a caution. In some cases the number of offenders so cautioned was three or four times that of the number brought before the Juvenile Courts, but none of the cautioned cases found a place in the statistics.

Personally he fully agreed with the conclusions of Dr. Rhodes that juvenile delinquency was linked both with density of population and with unemployment, but he felt that there were so many other unknown variables to be taken into account that it was very difficult to make any accurate forecast from the data available as to the probable future course of juvenile delinquency. This was the practical angle from which the problem was approached, and if assistance could be afforded from the labours of statisticians it would be very welcome.

MR. J. H. BAGOT (Liverpool) said that he had been conducting an enquiry into juvenile delinquency in his city. A good deal of conjecture had arisen as to whether the recorded increase in cases was a real increase. There were no absolute figures which would afford information on the point, but in his opinion there was no real increase. He was concerned with boys and girls in his own work, and he had not observed any recent deterioration in their morals or behaviour. In his view it was largely a matter of treatment. In 1847 the Larceny Act gave the first summary jurisdiction in cases of felony to the magistrate, and two years afterwards one found in a charge given to a Grand Jury the statement that in the first six months of the year in question as many cases had been heard in the City Courts of Summary Jurisdiction as during the twelve months before the passing of the Act. Again, in the years 1907-12 the figures went up by 100 per cent., from approximately 7,000 to 13,000 or 14,000, almost exactly what had happened during the recent six years, 1933-38. The number of cases went up during the war, but after the war it came tumbling down again. In a recent investigation he had stated that only if the figures failed to recede after 1938 or 1939 could the presence of any fresh factor be suspected. The figures for indictable offences had been rising since 1931, rapidly since 1933, but there had been no corresponding rise in the figures for adults, and this bore out what he had just said—that it was largely a matter of treatment.

Mr. Hill had already drawn attention to the fact that in some districts it was the practice of the police to administer cautions. In Liverpool most of the cautions were for indictable offences. In every case when a caution was administered guilt had been admitted. The figures for the last thirty years showed that, as the number of cases coming before the Courts increased, the number of cautions fell to a most noticeable extent. For those thirty years the correlation between cautions and indictable offences was -0.54 ± 0.13 . In Liverpool during the last five years every figure had risen steadily, with the exception of cautions, which had fallen equally steadily.

Dr. Rhodes had separated counties from towns, and in his own calculations he had done the same, but his definition of counties was slightly different. Dr. Rhodes had included all towns of less than 40,000 inhabitants in the counties, while in his own case all the towns which had separate police forces were distinguished from counties. His figures showed that in 1923 47 per cent. of all juveniles prosecuted for indictable offences were in the counties. In 1927

the figure was again 47 per cent., but in 1931 it had fallen to 44 per cent., and in 1936 and again in 1937 it was 37 per cent. Although the total number had risen in the counties, the proportion had been decreasing steadily over the last six years. He thought this was largely due to the fact that when new Acts came into force, they were always put into operation more rapidly and with greater effect in towns than in country districts.

Everyone who was concerned with juvenile delinquency was aware of the sex difference. One of the most important factors was that juvenile delinquents generally were dealt with in "gangs." These "gangs" were nothing but groups of boys playing about together, and boys' play differed in its nature from that of girls. Boys, again, had greater tendency to wander away from home, and they wandered in groups. They were, further, more inclined to take risks. Very few girls of school age came before the courts at all. Most of the cases of girls in Liverpool were aged 14-16, and half of them were brought up for stealing garments or jewellery and the like, and the motive was fairly obvious. The most serious form of delinquency in girls—namely, sexual delinquency and immorality—was not included. Girls guilty of that form of delinquency were dealt with as being in need of care and protection, and they did not figure as offenders at all. Their numbers were unknown, except to the Home Office and to those dealing with them in the different localities.

Dr. Rhodes had divided his figures into towns and counties. He himself had further divided them into north and south. For this purpose he had left out Wales and Monmouth, and had taken the division as it was given in *Criminal Statistics*, 1929, in which a detailed discussion appeared on the significant differences between juvenile delinquency and adult crime in north and south. All these figures had increased during the last six years, but not to the same extent, and the proportions in some cases had declined. In the north the proportion of indictable offenders found in counties had diminished from 24 to 20, and in the towns of the north from 35 to 30. In the counties of the south it had also diminished from 17 to 15½, and the only increase in proportions was in the towns of the south, largely accounted for, of course, by the Metropolitan district. This change in proportion was very significant, and the trend was likely to continue. In recent years there had been a considerable migration of industry from north to south, which accounted for much of the depression in the north, and it would also bring much crime and delinquency to the south. If the conclusion drawn from Dr. Rhodes's figures, that urbanization was an important factor in delinquency, were true—and no one would doubt it—it was in proportion as the south became urbanized that the tendency to crime and delinquency would increase. In fact, the percentage of juvenile delinquents, boys and girls, found in the southern towns had increased from 26 to 33, and if one went back to an earlier year, 1927, it had increased from 22 to 33. In other words, in 1927 less than a quarter of all juvenile delinquents were in southern towns, including London, and in 1937 about one-third were in southern towns.

He wished to comment on the great wastage which took place in probation and education offices and police departments through the non-use of statistics. We were years behind the United States in this respect. Statistics were a help in certain important connections. When justices were appointed it often happened that they did not know much about juveniles, and might start off on wrong lines altogether. One magistrate might find that a large proportion of his cases were returning to the Courts. No effort was made at present in many districts to inform the magistrate that his cases were not being successful and that his adjudications were not as good as those of some others. He might go on with the same faults and misconceptions year after year. Elementary statistics would bring home to him that there was something wrong with his methods.

He desired to give a few simple results of his own investigations into more than 3,000 cases of juvenile delinquency in Liverpool. It was apparent from Dr. Rhodes's Tables showing the proportion of offenders per thousand population that Liverpool and Bootle, which formed one block, was the worst area in the whole country. Taking Mr. Seeborn Rowntree's "Human Needs" standard of poverty, in which he allowed a certain amount of spending on other than strict necessities, 85 per cent. of the cases were below the poverty line, and 50 per cent. were below the line which allowed for nothing but bare necessities. The question was often asked why, if poverty had such a strong effect, one child was a delinquent and another in the same circumstances was not. But in nearly 50 per cent. of these 3,000 cases at least one other member of the same family had been before the Court for an indictable offence, and in many of the cases three or four members of the family had been before the Court. Delinquency did, in fact, tend to occur in the same families, and this did not support the arguments of those who minimized the effect of poverty.

In more than 60 per cent. of his cases the delinquents came from the families of unskilled workers and over 50 per cent. of the fathers were unemployed. About 50 per cent. came from broken homes, meaning homes where one parent was absent for some reason—such as death, divorce, or desertion. If among broken homes were included those in which there was strong incompatibility of temperament, the figure would be much greater, but that hardly lent itself to statistical enquiry. Overcrowding was far worse among the delinquents than amongst the general population, and, perhaps most significant of all, the families in which there were delinquents were very much larger. In the survey of Merseyside undertaken by the University of Liverpool between 1929 and 1932 the average size of the working-class family was $2\frac{1}{2}$ dependants. The average of certain abnormal classes, such as families where there was a history of blindness and epilepsy, was also tabulated, and the largest was in the neighbourhood of 4.8 dependants, but the average family in which there were delinquents was about 5.25. That, again, was associated with overcrowding. His conclusions from his Liverpool experience were that the vast proportion of the delinquents were

drawn from one section of the population, and, within that one section, from a defective group, either from the point of view of family or overcrowding.

In an address to the Royal Statistical Society in March 1900, when the same subject was under discussion, the Rev. W. D. Morrison said, "Not until the social conditions of the masses of the people are improved will there be a real improvement in these figures." That still held good.

MISS CROSLAND (Assistant Principal Probation Officer) said that she was appointed a Juvenile Court Probation Officer in 1918, and worked at that time at Tower Bridge Police Court. It was the last year of the war, and there were only women probation officers in the Juvenile Courts; indeed, there were only women in those Courts in London right down to 1933. At Tower Bridge she remembered thinking how extremely good the girls must be, because so few of them were charged. But in 1919 she went to Bow Street, and there found the proportion quite different. About 30 per cent. of the cases there were girls, and she came to the conclusion that the district made all the difference, Bow Street belonging to a very interesting area, including the Strand and Piccadilly Circus, where temptations were manifold. Her colleague at Tower Bridge was very much interested because for quite a long time there were no cases at all from what was then a notoriously bad district of London—namely, Bermondsey. The conclusion they came to eventually was that in a great many of these districts they were just in the hands of the police in these matters. If the police were interested in juvenile crime, they would bring cases to the Courts. She had always felt rather afraid of statistics, because, taking London at any rate, the whole thing was so patchy. When the Probation Officers and the police co-operated, quite good work would be done. But in certain districts a good many juveniles were brought to the Court when they ought not to be, and in others a good many were not brought when it was desirable that they should be. In London, at any rate, unemployment amongst juveniles could not be regarded as a factor in delinquency, as school-leavers had no difficulty in getting straight into work.

MR. SIMPSON (Probation Officer) said that he was interested in the discussion, and particularly in the references to unemployment as a cause of delinquency. He agreed that it was a contributory factor, but felt that perhaps too much stress had been placed upon it. Out of 70 cases under his care at the moment, he could name only two in which unemployment had definitely been the cause of the crime. One of them was a member of a family of fifteen who had come to London from Scotland in the hope of finding work, the other was the case of a middle-class man who had lost his wife and had been out of work for four years. The boy had stolen a bicycle in order to help his father; the boy's own cycle had been stolen a few days previously.

He also referred to the menace of pin-table saloons and fun-

fairs, as these had a definite contribution to make towards crime, and at the moment he had a good number of boys whose first downfall was caused by wanting money to spend on these amusements. He felt that some legislation to combat this evil would be of immense value.

He felt rather worried about the number of cases of juvenile delinquents he had been getting from the big housing estates. Many of these boys had no facilities provided for the proper spending of their leisure; up to the age of 14 the State did everything for the child, medically and educationally, but at 14 the boy, released from the discipline of school, might become a wage-earner with a certain feeling of independence, and nobody cared very much what he did with his spare time. This, in his opinion, was one of the biggest factors contributing to juvenile delinquency. Again, in the absence of any apprenticeship system and the opportunity of learning a trade, the boy found himself, at the age of 17 or 18, not wanted any longer in industry. In this mechanized world, a girl could do the work which twenty years ago called for a skilled man.

He felt that a great contribution to the lessening of juvenile delinquency would be made if more were done to assist community life on the large building estates and the teaching of the right use of leisure for youth. He also felt that parents should be taught to take their heritage of parenthood more seriously, as very often children came before the Courts because of the parents' lack of understanding and proper control.

He concluded by saying that he very warmly welcomed the use of statistical methods in trying to find the root causes of juvenile delinquency, and felt that the practical social worker might also be able to help the statisticians by giving a lead as to some of the factors that only a skilled social worker would meet with.

MISS CLEMENT-BROWN (London School of Economics, Mental Health Course) said that she thought that the Juvenile Court figures did not represent the true disparity between delinquency in boys and girls. It was difficult to compare the figures of different countries because of wide variety in law and administration, but in California, where she had worked in the Juvenile Court, there was much closer correspondence between the number of delinquent boys and girls, even when allowance was made for the fact that the age went up to twenty-one, and that illicit sex relationships were included.

In one Child Guidance Clinic in England it had been found that during a period of two years an approximately equal number of boys and girls were referred for stealing.

Her impression was that a larger proportion of girls who stole were not brought before the Court at all. It seemed likely that before the age of employment girls tended to steal from their homes to a greater extent than boys, and there was consequently less resort to legal action.

It seemed questionable whether, if one were to consider actual behaviour rather than "being found guilty of indictable offences,"

it would be true to say that juvenile delinquency is "practically confined to the male sex."

The disparity between the figures of delinquency in the county and town areas made an interesting comparison with what was apparently an inverse ratio in the incidence of mental deficiency in rural and urban districts. The Wood Report of 1929, in a survey of three urban and three rural areas, had found the incidence of defect to be 65 per cent. higher among children living in the country than among those living in the towns, and the difference was rather greater in respect of the higher grades of defectives from among whom it might be supposed that delinquent children would be drawn. In the early part of this century enormous emphasis had been laid upon sub-normal intelligence as a cause of delinquency and crime. More recent studies both in Great Britain and in the United States seemed to show that intelligence as a single factor had been given much too much weight, and it might be worth while to make a more detailed comparison between the figures of delinquency and of mental defect in the same areas with a view to throwing more light upon this relationship.

Reference had been made to the need of magistrates for more knowledge of the statistics of delinquency. It seemed, however, that for the task of the magistrate other kinds of study might be of greater importance. The summing up of a complicated case in Court, taking into account all the subtle influences which determine individual behaviour, called for a fineness of perception which might indeed be combined with expertness in statistics, but was perhaps not inseparably combined therewith.

The question which really concerned her, and upon which she would welcome the guidance of statisticians, was how to get some further understanding of the relationship between the case-study method of investigation and statistical surveys such as this of Dr. Rhodes. On the one hand there were accumulating in Courts and Clinics numbers of detailed studies of individual delinquents to which social workers and medical and educational psychologists contributed. On the other hand there were these wide-scale sociological investigations which might reveal where certain social tendencies lay, but could seldom help us with the individual case. Numbers of studies had been made of collections of case-histories in which groups of delinquents and of non-delinquents were compared and correlations worked out between delinquency and various so-called "factors." It seemed likely, however, that the isolation of such factors itself involved serious fallacies. Were we justified, for instance, in separating the influence of a child's physical health from the relationship between the child and his step-mother? Superior vitality might cancel out the damaging influence of a malevolent step-mother. Were we dealing with living organisms and changing social relationships which could not with validity be split up into separate units and then related together in numerical form?

This was a question to which it seemed that some more satisfactory answer was urgently needed. There seemed to be scope here for much closer co-operation between case workers and statisticians.

DR. MANNHEIM said that he would like to take up Miss Clement-Brown's last point as to how statistics and case-studies could be related. Statistical studies were able to draw attention to certain outstanding facts which—whether they might be right or wrong—would require special study, and it might be possible from the case-study to prove whether the statistical findings were right or wrong. But at present he could not find any real connection between these methods. Statistical methods would always give a first indication. Dr. Rhodes had dealt with the problem of urban and rural areas, and his findings were on the whole in harmony with the accepted findings of criminology in general, that crime was more an urban than a rural phenomenon, though there were in his Tables some exceptions to this rule.

He wanted to underline one aspect of the matter. As had been pointed out, many Chief Constables were very fond of cautioning offenders instead of bringing them before the Juvenile Court. He remembered an observation of the Chief Constable of one English city, who said that when he took over his office in 1923 he found that the delinquency rate for the previous ten years was about 400, which he thought too high, and therefore he favoured a method of cautioning, with the result that from 1923 to 1933 the rate of juvenile delinquency had fallen to about 100! There were many good reasons for the method of cautioning. The problem was whether it was possible to combine both sets of figures. There was apparently not always a real correlation between the number of cases dealt with by cautioning and those which appeared in the *Criminal Statistics*. It might be useful to include the figures for cautioning in the *Criminal Statistics*, though he was well aware that an offence dealt with by cautioning could not be regarded as conclusively proved, even if the juveniles pleaded guilty; they might do so on the understanding that they would simply be cautioned.

In the problem of urban and rural delinquency, was the place of residence taken or the place where the crime was committed? The juvenile might reside in one place and commit his crime in another. Usually, the second method was followed. A further aspect was the type of the crime. It was an accepted fact that one had to distinguish between different types of crime in rural and in urban districts. A higher rate of crime of a certain type was found in certain areas. Crimes against property were more frequent in urban districts, and crimes against the person were perhaps more frequent in rural. Arson was a crime which might be more frequent in rural districts. Then there was the relation between the size of the town and the crime incidence. The crime rate, as was confirmed by Dr. Rhodes's figures, did not always increase with the size of the town. There might be relatively more crime in a middle-sized city than in a large city, the former offering many temptations and opportunities for crime, while lacking the trained police force of the big city. It might also be interesting to distinguish between different types of towns—for example, seaports, pleasure resorts, and industrial and mining towns. This was done about thirty or

forty years ago in the *English Criminal Statistics* with interesting results.

As to unemployment, a few years ago he carried out an investigation into about 1,000 cases of Borstal boys and girls, and found a very high correlation between unemployment and poverty in general and delinquency. The problem of control groups was, of course, a very difficult one. Control groups were indispensable, but the whole idea of using control groups in criminological investigations might be over-estimated.

MR. DUDLEY WALTON said that Miss Crosland had referred to Bermondsey, a part of London with which he was somewhat familiar. It occurred to him that there might be some other reason than the inactivity of the police for the apparent immunity of Bermondsey. It was possible that the people of Bermondsey were very much more satisfied with the conditions of their local government than, say, the people of Holborn. In recent years Bermondsey had overhauled the whole of its local machinery, hundreds of flats had been built, taking the place of small slummy houses, cinemas had been built, and all sorts of things had happened to Bermondsey. He was not really surprised to hear that there were no juvenile offences in such a happy borough!

THE PRESIDENT hoped that on some other occasion Miss Clement-Brown's challenge to the statisticians would be met. With regard to the separation of factors, there was the method of partial correlation, which ought to deal with the cancelling of one apparent result against another, but it depended on having a rather larger number of cases than simple correlation between two variables—a larger number than was to be found in case-records. In the few groups he had seen of this kind he had been perplexed by the small number of cases presented for mathematical handling. When it came to the thousand cases, there was a possibility of more definite mathematical analysis and of arriving more clearly at the relationship between the different factors and at the importance of the different factors when separated.

As regards the relationship between the case-records and the general statistics, he supposed that the line to be followed should be this: The whole of the group that was included as delinquent under the definition given should first be taken, then a random or stratified sample of sufficient size to be conveniently handled and to bear analysis should be selected and the separate cases followed up in detail, the individual history of each of them being elicited. This having been done, one would be in a position to generalize from the sample to the larger amount. That, surely, was what was commonly done in statistical investigations. A survey for some purpose was taken of the whole population, and for special purposes a detailed sample was taken; the sample was investigated, and then a generalization was made, with sufficient care, from the sample to the whole. He would suppose from what he had read or heard of these case investigations that the material was accumulating

to make possible this kind of generalization. It might be that the psychologists in charge were so interested in the particular cases that they over-elaborated the investigation and there was not enough time to spread it. Some balance must be maintained between the intensive and the extensive method.

After all, the people at clinics and at Police Courts and those generally interested in the young were not concerned ultimately in finding correlations or making pretty tables. They were concerned with getting the appropriate remedies for the delinquencies which they found. All the rest was important as discovering the causation of delinquency, but the actual task of greatest importance was to examine the particular case and form a judgment as to the cure, and that was not a statistical but a psychiatric question.

He was very much interested in this type of enquiry, and he thought it was at least courteous to take up Miss Clement-Brown's challenge in a preliminary way, hoping it would be dealt with later by the competent psychological statisticians who were to be found in this country and in America.

DR. RHODES, replying, wrote: A discussion on some aspect of criminal statistics is a rare event in the annals of the Society. It is interesting to learn from Mr. Bagot that the subject of Juvenile Delinquency had been before the Society in 1900.

The present discussion is useful because it brings to the Society many different points of view. The opening part of the discussion merely presents a broad outline of the present incidence of Juvenile Delinquency in the country. Mr. Hill and Mr. Bagot place the present position in relation to the past and give the reasons why the period 1934-36 was chosen for discussion. Considerable attention has been given elsewhere to the increase in the recorded number of juvenile delinquents in these years, and it has been pointed out that this increase may not mean that the children of to-day are any less moral than those of the past. The suggestion is that with new laws and new treatment of the problem the statistical data are changed by definition of units and characteristics. To a certain extent this still remains a matter of opinion.

The information given by Mr. Bagot relating to his own researches is most helpful in assisting to enlarge the picture presented by the data of the beginning of the discussion. In certain respects his special researches in Liverpool support the broad conclusions reached from a study of the national statistics.

It is useful to get the point of view of Miss Crosland and Mr. Simpson. They see the individuals who later become units in statistical tables. Too often the statistician knows little of the circumstances of the recording of his raw material, and the opinions of those who are responsible for the original data are necessary in a full consideration of a problem because they have knowledge of the units which is often not recorded statistically.

Miss Clement-Brown refers specifically to the case method of study of such problems as ours. There is no doubt that data of this sort can be handled statistically when they are reasonably numerous,

and when agreement can be reached as to the grouping of individuals with like characteristics together. If each case is in every particular different from the rest, then difficulties arise. But, in practice, when conclusions are drawn from a detailed examination of individual cases, the investigator does go through the process of classification even though sometimes he may not know it.

The difficulties really seem to lie in the use of symbols to replace whole sentences of description.

As a result of the ballot taken during the meeting the candidates named below were elected Fellows of the Society:—

Arthur Child.

Kenneth Sumderland, B.Sc.

Frederick Cecil, B.Sc.

Colonel Henry John Percy Oakley, M.C., F.I.A.

MISCELLANEA

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RECENT ADVANCES IN MATHEMATICAL STATISTICS

Bibliography of Mathematical Statistics (1937, second half, and 1938)

By H. O. HARTLEY, PH.D.

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A YEAR ago the Society decided to modify their original plan of publishing annually a complete critical review of the publications on Mathematical Statistics. This decision was taken because of the ever-growing volume of material. It was decided to publish a periodical bibliography leaving a critical review of some of the papers to articles dealing with special branches of the subject which are to be published from time to time.

The first bibliography of this kind was compiled by Dr. J. O. Irwin (this *Journal*, Vol. CI, pp. 394-433, 1938) and covered a period of about $2\frac{1}{2}$ years (end of 1934 to middle of 1937). The list of papers which follows goes from the middle of 1937 to the beginning of 1939, thus covering a period of about $1\frac{1}{2}$ years. A glance at the total number of papers published during the respective periods (586 during the first period as compared with 520 during the second period) indicates a further increase in the annual production of papers. It must, however, be borne in mind that there is a (certainly laudable) tendency to reduce the lengths of individual papers, a tendency which has been encouraged by the editors of a number of journals. Nevertheless the increase in the number of *periodicals* from which the references have been compiled seems to indicate a further growth of the quantity, at any rate, of the published work on the subject.

In a bibliography like this it is often difficult to decide on whether or not papers on the border-line of mathematical statistics should be included. The section on "Theory" includes papers on those branches of pure mathematics which have hitherto been applied to statistical problems such as the theory of probability, curve fitting, orthogonal polynomials, Fourier transforms, etc. It is, of course, difficult to forecast which sections of mathematical research will turn out to be of importance for future statistical work. It may, therefore, become necessary to include in future bibliographies papers involving other branches of mathematics, such as the theory of finite groups, the theory of matrices or the theory of differential equations if these are applied to statistical theory.

A more liberal view has been taken when dealing with the applications where new mathematical methods have been included, even if their relation to statistics proper is occasionally remote. This accounts largely for the large number of papers on applications to psychology. Papers on statistical physics have been excluded; firstly because a complete list of papers on this subject would go far beyond the scope of this bibliography, and also because this aspect of the subject is dealt with elsewhere. The same applies to mathematical theories in economics as far as they stand aloof from statistical methods.

Completeness of the bibliography was aimed at, although it is realized that, with the above limitations in mind, this goal has not been fully achieved.

Dr. J. O. Irwin, who compiled the previous bibliography, has rendered valuable help, and this opportunity is gladly taken to thank him for his advice.

1. SPECIAL BIOGRAPHICAL NOTES

- (1) FISHER, R. A. "Student."
Annals of Eugenics, Vol. IX, pp. 1-9, 1939.
- (2) McMULLEN, L. William Sealy Gosset, 1876-1937. (1)
"Student" as a man.
Biometrika, Vol. XXX, pp. 205-10, 1939.
- (3) PEARSON, E. S. Karl Pearson, An appreciation of some aspects of his life and work. Part II, 1906-1936.
Biometrika, Vol. XXIX, pp. 161-248, 1938.
- (4) PEARSON, E. S. "Mr. W. S. Gosset."
Nature, Vol. 140, p. 838, 1937.
- (5) PEARSON, E. S. William Sealy Gosset, 1876-1937. (2)
"Student" as statistician.
Biometrika, Vol. XXX, pp. 210-50, 1939.

II. THEORY

- (1) AITKEN, A. C. Note on a special determinant.
Math. Notes Edinb. Math. Soc., 30, pp. 27-9, 1937.
- (2) ALLEN, H. V. A theorem concerning the linearity of regression.
Statistical Research Memoirs, Dep. Stat. U. London, U. Coll., Vol. II, pp. 60-8, 1938.
- (3) AMBARZUMIAN, G. Verteilungskurven der Wahrscheinlichkeiten, welche im Limit die Verteilungskurven von Pearson ergeben.
C.R. Acad. Sci. U.R.S.S., N. Vol. 16, pp. 251-4, 1937.
- (4) ANDREOLI, G. Statistica delle variazioni di stato.
Accad. Sci. Fis. e Mat. Napoli Rend., Vol. IV, s. 7, pp. 108-30, 1937.
- (5) ANDREOLI, G. Statistica nelle collectività soggette a rinnovamento.
Accad. Sci. Fis. e Mat. Napoli Rend., Vol. IV, s. 7, pp. 131-45, 1937.
- (6) AROIAN, L. A. The Type B Gram-Charlier Series.
Annals Math. Statistics, Vol. VIII, pp. 183-93, 1937.
- (7) AYYANGAR, A. A. K. On the semi-invariants of two variates and their additive property.
Proc. of the 1st Session of the Indian Statistical Conference, Calcutta, 1938, pp. 85-91, and *Sankhyā*, Vol. 4, pp. 85-91, 1938.
- (8) AYYANGAR, A. A. K. On the semi-invariants of two variates and their additive property.
J. Indian Math. Soc., N.s. 3, pp. 1-7, 1938.
- (9) BAILEY, W. N. The generating function of Jacobi polynomials.
J. Lond. Math. Soc., Vol. 13, pp. 8-12, 1938.
- (10) BAILEY, W. N. An integral representation for the product of two Hermite polynomials.
J. Lond. Math. Soc., Vol. 13, pp. 202-4, 1938.
- (11) BAKER, G. A. Correlation surfaces of two or more indices when the components of the indices are normally distributed.
Annals Math. Statistics, Vol. VIII, pp. 179-83, 1937.
- (12) BAKER, G. A. The probability that the standard deviation of a second sample will differ from the standard deviation of a first sample by a certain multiple of the first sample.
Metron, Vol. XIII, Part 3, pp. 49-54, 1938.
- (13) BARTLETT, M. S. The characteristic function of a conditional statistic.
J. Lond. Math. Soc., Vol. 13, pp. 62-7, 1938.

- (14) BARTLETT, M. S. Further aspects of the theory of multiple regression.
Proc. Camb. Phil. Soc., Vol. 34, pp. 33-40, 1938.
- (15) BAWLY, G. Ueber den lokalen Grenzwertsatz der Wahrscheinlichkeitsrechnung.
Rev. Fac. Sci., Univ. Istanbul, Ns. 2, Fasc. 2, pp. 79-92, 1937.
- (16) BEALE, F. S. On the polynomials related to the differential equation

$$\frac{1}{y} \frac{dy}{dx} = \frac{a_0 + a_1x}{b_0 + b_1x + b_2x^2} \frac{N}{D}$$
Annals Math. Statistics, Vol. VIII, pp. 206-24, 1937.
- (17) BERGE, P. O. A note on a form of Tchebycheff's theorem for two variables.
Biometrika, Vol. XXIX, pp. 405-7, 1938.
- (18) BERNSTEIN, F. Regression and correlation evaluated by a method of partial sums.
Annals Math. Statistics, Vol. VIII, pp. 77-89, 1937.
- (19) BERNSTEIN, S. Sur quelques modifications de l'inégalité de Tchebycheff.
C.R. Acad. Sci. U.R.S.S., Ns. 17, pp. 279-82, 1937.
- (20) BIRKHOFF, G. Dependent probabilities and spaces (I).
Proc. Nat. Acad. Sci., Vol. 24, pp. 154-9, 1938.
- (21) BOAS, R. P., and SMITHIES, F. On the characterization of a distribution function by its Fourier transform.
Amer. J. Math., Vol. LX, pp. 513-22.
- (22) BOCHNER, S. Stable laws of probability and completely monotone functions.
Duke Math. J., Vol. 3, pp. 726-8, 1937.
- (23) BOREL, E. Sur les lois d'évolution probable des ensembles finis de segments.
Comptes Rendus, t. 206, pp. 137-40, 1938.
- (24) BOREL, E. Sur le pari mutuel.
Comptes Rendus, t. 207, pp. 197-9, 1938.
- (25) BOSE, R. C. On the distribution of the means of samples drawn from a Bessel function population.
Sankhyā, Vol. 3, pp. 262-4, 1938.
- (26) BOSE, R. C. On the application of Galois fields to the problem of construction of Hyper-Græco-Latin Squares.
Sankhyā, Vol. 3, pp. 323-38, 1938.

- (27) BOSE, R. C., and ROY, S. N. The distribution of the studentised D^2 -statistic.
Proc. of the 1st Session of the Indian Statistical Conference, Calcutta, 1938, pp. 19-38, and *Sankhyā*, Vol. 4, pp. 19-38, 1938.
- (28) BOSE, S. N. On the moment coefficients of the D^2 -statistic and certain integral and differential equations connected with the multivariate normal population.
Sankhyā, Vol. 3, pp. 105-24, 1937.
- (29) BOSE, S. S. On a Bessel function population.
Sankhyā, Vol. 3, pp. 253-60, 1938.
- (30) BOSE, S. S. Relative efficiencies of regression coefficients estimated by the method of finite differences.
Sankhyā, Vol. 3, pp. 339-46, 1938.
- (31) BRELOT, M. Quelques difficultés dans l'application pratique de la théorie des erreurs.
Mathematica, Vol. 13, pp. 243-57, 1937.
- (32) BRELOT, M. Sur l'influence des erreurs de mesure en statistique.
J. Math. Pure Appl., 9^e s., t. 16, pp. 285-306, 1937.
- (33) BRIDGER, C. A. Note on regression functions in the case of three second-order random variables.
Annals Math. Statistics, Vol. IX, pp. 309-13, 1938.
- (34) BRODERICK, P. S. On some symbolic formulæ in probability theory.
Proc. Roy. Irish Acad., A, Vol. 44, pp. 19-28, 1937.
- (35) BRUEN, C. Methods for the combination of observations: modal point or most lesser-deviations, median loci or least squares and mid-point of least-range or least greatest deviation.
Metron, Vol. XIII, Part 2, pp. 61-140, 1938.
- (36) BUCHANAN-WOLLASTON, H. J. A useful statistical test.
Nature, Vol. 142, p. 160, 1938.
- (37) CAMP, B. H. Methods of obtaining probability distributions.
Annals Math. Statistics, Vol. VIII, pp. 90-101, 1937.
- (38) CAMP, B. H. Notes on the distribution of the geometric mean.
Annals Math. Statistics, Vol. IX, pp. 221-6, 1938.
- (39) CAMP, B. H. Correction to the paper "The multinomial solid and the chi-test."
Trans. Amer. Math. Soc., Vol. XLIV, p. 151, 1938.
- (40) CAMP, B. H. Further interpretations of the chi-square test.
J. Amer. Stat. Assoc., Vol. 33, pp. 537-42, 1938.
- (41) CHAPMAN, R. A. Applicability of the z -test to a Poisson distribution.
Biometrika, Vol. XXX, pp. 188-90, 1938.

- (42) CISBANI, R. Contributi alla teoria delle medie.
Metron, Vol. XIII, Part 2, pp. 23-60, 1938.
- (43) CISBANI, R. Contributi alla teoria delle medie, II.
Metron, Vol. XIII, Part 3, pp. 3-20, 1938.
- (44) CLARK, C. E. Note on the binomial distribution.
Annals Math. Statistics, Vol. VIII, pp. 116-17, 1937.
- (45) COCHRAN, W. G. The omission or addition of an independent variate in multiple linear regression.
J. Roy. Stat. Soc., Suppl., Vol. V., pp. 171-6, 1938.
- (46) COPELAND, A. H. Consistency of conditions determining collectives.
Trans. Amer. Math. Soc., Vol. XLIII, pp. 333-57, 1937.
- (47) CORNISH, E. A., and FISHER, R. A. Moments and cumulants in the specification of distributions.
Rev. de l'Institut Intern. de Stat., 5^e Année, pp. 307-20, 1937.
- (48) CRAIG, A. T. On the independence of certain estimates of variance.
Annals Math. Statistics, Vol. IX, pp. 48-56, 1938.
- (49) CRAMÉR, H., LÉVY, P., and DE MISES, R. Les sommes et les fonctions de variable aléatoires.
Confer. Intern. de Scis., Math., III, 1938.
- (50) CRAMÉR, H. Entwicklungslinien der Wahrscheinlichkeitsrechnung.
Congr. Math. à Helsingfors, 1938, pp. 1-20, 1938.
- (51) DANIELS, H. E. The effect of departures from ideal conditions other than non-normality on the *t*- and *z*-tests of significance.
Proc. Camb. Phil. Soc., Vol. 34, pp. 321-8, 1938.
- (52) DARMOIS, G. Sur le rendement des observations statistiques.
J. Société Stat. Paris, 78^e Année, pp. 310-19, 1937.
- (53) DAVID, F. N. Limiting distributions connected with certain methods of sampling human populations.
Statistical Research Memoirs, Dep. Stat. U. Lond., U. Coll., Vol. II, pp. 69-90, 1938.
- (54) DAVID, F. N., and NEYMAN, J. Extension of the Markoff theorem on least squares.
Statistical Research Memoirs, Dep. Stat. U. Lond., U. Coll., Vol. II, pp. 105-16, 1938.
- (55) DELL'AGNOLA, C. A. Sulla tendenza ad una variabile casuale limite di una successione di variabili casuali punteggiate discontinue.
Atti Ist. Veneto Sci., Vol. 96, pp. 365-88, 1937.
- (56) DEMING, W. E. Some thoughts on curve fitting and the chi-square test.
J. Amer. Stat. Ass., Vol. 33, pp. 543-51, 1938.

- (57) DODD, E. L. Regression coefficients as means of certain ratios.
American Math. Monthly, Vol. XLIV, pp. 306-8, 1937.
- (58) DODD, E. L. Interior and exterior means obtained by the method of moments.
Annals Math. Statistics, Vol. IX, pp. 153-7, 1938.
- (59) DODD, E. L. The median quartiles, and other positional means.
American Math. Monthly, Vol. XLV, pp. 302-7, 1938.
- (60) DOEBLIN, W. Le cas discontinu des probabilités en chaîne.
Publ. Fac. Sci. Univ. Masaryk, Nr. 236, pp. 3-13, 1937.
- (61) DOEBLIN, W. Sur le cas continu des probabilités en chaîne.
Atti Accad. naz. Lincei Rend., t. 25, pp. 170-6, 1937.
- (62) DOEBLIN, W. Sur l'équation de Kolmogoroff.
Comptes Rendus, t. 207, pp. 705-7, 1938.
- (63) DOEBLIN, W. Sur les sommes d'un grand nombre de vecteurs aléatoires.
Comptes Rendus, t. 207, pp. 511-13, 1938.
- (64) DOEBLIN, W. Étude de l'ensemble de puissances d'une loi de probabilité.
Comptes Rendus, t. 206, pp. 718-21, 1938.
- (65) DOEBLIN, W. Premier éléments d'une étude systématique de l'ensemble de puissances d'une loi de probabilité.
Comptes Rendus, t. 206, pp. 306-7, 1938.
- (66) DOEBLIN, W., and FORTET, R. Sur des chaînes à liaisons complètes.
Bull. Soc. Math. France, t. LXV, pp. 132-48, 1937.
- (67) DOOB, J. L. Stochastic processes depending on a continuous parameter.
Trans. Amer. Math. Ass., Vol. XLII, pp. 107-40, 1937.
- (68) DOOB, J. L. Stochastic processes with an integral-valued parameter.
Trans. Amer. Math. Soc., Vol. XLIV, pp. 87-150, 1938.
- (69) DUGUÉ, D. Application des propriétés de la limite au sens du calcul des probabilités à l'étude des diverses questions d'estimation.
J. École polytechn., Vol. III, Nr. 4, pp. 305-73, 1937.
- (70) DWYER, P. S. Use of subcorrelation in the analysis of non-linear or non-homoscedastic correlation charts.
J. Educ. Psych., Vol. XXVIII, pp. 541-7, 1937.
- (71) DWYER, P. S. Combined expansions of products of symmetric power sums and of sums of symmetric power products with application to sampling.
Annals Math. Statistics, Vol. IX, pp. 1-47, 1938.

- (72) DWYER, P. S. On combined expansions of products of symmetric power sums and of sums of symmetric power products with application to sampling (continued).
Annals Math. Statistics, Vol. IX, pp. 97-132, 1938.
- (73) ELFRING, G. Zur Theorie der Markoff'schen Ketten.
Acta Soc. Sci. Fennica, s. 2, pp. 1-17, 1937.
- (74) ELFRING, G. Ueber die Interpretation von Markoff'schen Ketten.
Soc. Sci. Fennica Comment. phys.-nat., Vol. 10, Nr. 3, pp. 1-8, 1938.
- (75) ERDÉLYI, A. Ueber eine erzeugende Funktion von Produkten Hermitescher Polynome.
Math. Zeitschrift, Vol. 44, pp. 201-11, 1938.
- (76) ERDÉLYI, A. Sulle connessioni fra due problemi di calcolo delle probabilità.
Giorn. Ist. Ital. Attuari, Vol. VIII, pp. 328-37, 1937.
- (77) ERDÖS, P., and TURÁN, P. On interpolation, I.
Annals of Mathematics, Vol. 38, pp. 142-55, 1937.
- (78) ERDÖS, P., and TURÁN, P. On interpolation, II. On the distribution of fundamental points of Lagrange and Hermite interpolation.
Annals of Mathematics, Vol. 39, pp. 703-24, 1938.
- (79) EYRAUD, H. Sur quelques lois d'erreurs à deux dimensions.
Comptes Rendus, t. 206, pp. 402-4, 1938.
- (80) EYRAUD, H. Sur certaines décompositions en aléatoires imaginaires.
Comptes Rendus, t. 206, pp. 723-5, 1938.
- (81) FELDHEIM, E. Applicazioni dei polinomiali Hermite a qualche problema di calcolo delle probabilità.
Giorn. Ist. Ital. Attuari, Vol. VIII, pp. 303-27, 1937.
- (82) FELLER, W. Note on regions similar to the sample space.
Statistical Research Memoirs, Dep. Stat. U. Lond., U. Coll., Vol. II, pp. 117-25, 1938.
- (83) FELLER, W. Ueber das Gesetz der grossen Zahlen.
Acta Litt. Sci. Szeged, Vol. 8, pp. 191-201, 1937.
- (84) FERTIG, J. W., and PROEHL, E. A. A test of a sample variance based on both tail ends of the distribution.
Annals Math. Statistics, Vol. VIII, pp. 193-206, 1937.
- (85) FINNEY, D. J. The distribution of the ratio of estimates of the two variances in a sample from a normal bivariate population.
Biometrika, Vol. XXX, pp. 190-92, 1938.
- (86) FISHER, R. A. The statistical utilization of multiple measurements.
Annals of Eugenics, Vol. VIII, pp. 376-86, 1938.

- (87) FJELDSTAD, J. E. Bemerkung zu Viggo Brun : Gauss' Verteilungsgesetz.
Norsk. Mat. Tidsskrift 19, pp. 69-71, 1937.
- (88) FOUILLADE, A. Sur une conception de la théorie des probabilités en chaîne.
Bulletin Sci. Mathématique, 2^e s., t. 61, pp. 269-87, and pp. 295-302, 1937.
- (89) FRANCK, E. Sur les fonctions de fréquence de n variables. Relation générale entre les moments et les semi-invariants.
Aktuár Vědy, Vol. 6, pp. 163-7, 1937.
- (90) FRIEDMAN, M. The use of ranks to avoid the assumption of normality implicit in the analysis of variance.
J. Amer. Stat. Assoc., Vol. 32, pp. 675-701, 1937.
- (91) FRISCH, R. Note on the phase diagram of two variates.
Econometrika, Vol. V, pp. 326-8, 1937.
- (92) FRY, TH. C. The χ^2 -test of significance.
J. Amer. Stat. Ass., Vol. 33, pp. 513-26, 1938.
- (93) GEIRINGER, H. Sur les variables aléatoires arbitrairement liées.
Rev. math. Union Interbalkan, Vol. 2, pp. 1-26, 1938.
- (94) GEIRINGER, H. On the probability theory of arbitrarily linked events.
Annals Math. Statistics, Vol. IX, pp. 260-71, 1938.
- (95) GINI, C. Di una formula comprensiva delle medie.
Metron, Vol. XIII, Part 2, pp. 3-22, 1938.
- (96) GINI, C., and ZAPPA, G. Sulle proprietà delle medie potenziate e combinatorie.
Metron, Vol. XIII, Part 3, pp. 21-32, 1938.
- (97) GNEDENKO, B. Sur une propriété caractéristique des lois indéfiniment divisibles.
Bull. Univ. État Moscou, Sér. Int., Sect. A.: Math. et Mécan. 1, Fasc. 5, pp. 9-15, 1937.
- (98) GNEDENKO, B. Sur les fonctions caractéristiques.
Bull. Univ. État Moscou, Sér. Int., Sect. A.: Math. et Mécan. 1, Fasc. 5, pp. 16-17, 1937.
- (99) GNEDENKO, B. Ueber die Konvergenz der Verteilungsgesetze von Summen voneinander unabhängiger Summanden.
C.R. Acad. Sci. U.R.S.S., No. 18, pp. 231-4, 1938.
- (100) GUMBEL, E. J. Généralisation de l'inégalité de Boole.
Comptes Rendus, t. 205, pp. 774-7, 1937.
- (101) GUMBEL, E. J. La précision de la moyenne arithmétique et de la médiane.
Aktuár Vědy, pp. 145-54, 1937, Vol. 6.
- (102) GUMBEL, E. J. Le débit de crue médian au cours des années.
Comptes Rendus, t. 207, pp. 832-4, 1938.

- (103) GUMBEL, E. J. Gli eventi compatibili.
Giorn. d'Ist. Ital. Att., Anno IX, pp. 3-38, 1938.
- (104) GUTTMANN, L. A note on the derivation of formulæ for multiple and partial correlation.
Annals Math. Statistics, Vol. IX, pp. 305-8, 1938.
- (105) HABA, I. Sur les probabilités des évènements dépendants.
Publ. Fac. Sci. Univ. Charles IV, Prague, Nr. 154, pp. 21-4, 1937.
- (106) HALDANE, J. B. S. The first six moments of χ^2 for an n -fold table with n degrees of freedom when some expectations are small.
Biometrika, Vol. XXIX, pp. 389-91, 1938.
- (107) HALDANE, J. B. S. The approximate normalization of a class of frequency distributions.
Biometrika, Vol. XXIX, pp. 392-404, 1938.
- (108) HARTLEY, H. O. Studentization and large-sample theory.
J. Roy. Stat. Soc. Suppl., Vol. V., pp. 80-8, 1938.
- (109) HARTMANN, P., VAN KAMPEN, E. R., and WINTNER, A. On the distribution functions of almost periodic functions.
Amer. Math., Vol. LX, pp. 491-500, 1938.
- (110) HOEL, P. G. A significance test for component analysis.
Annals Math. Statistics, Vol. VIII, pp. 149-58, 1937.
- (111) HOEL, P. G. On the chi-square distribution for small samples.
Annals Math. Statistics, Vol. IX, pp. 158-65, 1938.
- (112) HOTELLING, H., and FRANKEL, L. R. The transformation of statistics to simplify their distribution.
Annals Math. Statistics, Vol. IX, pp. 87-97, 1938.
- (113) HSU, P. L. Contribution on the theory of "Student's" t -test as applied to the problem of two samples.
Statistical Research Memoirs, Dep. Stat. U. Lond., U. Coll., Vol. II, pp. 1-24, 1938.
- (114) HSU, P. L. On the best unbiased quadratic estimate of the variance.
Statistical Research Memoirs, Dep. Stat. U. Lond., U. Coll., Vol. II, pp. 91-104, 1938.
- (115) HSU, P. L. Notes on Hotelling's generalized T .
Annals Math. Statistics, Vol. IX, pp. 231-44, 1938.
- (116) JACOB, M. Sul fenomeno di Gibbs nello sviluppo in serie di polinomi di Hermite.
Giorn. Ist. Ital. Attuari, Vol. VIII, pp. 297-302, 1937.
- (117) JACKSON, D. Orthogonal polynomials on a plane-curve.
Duke Math. J., Vol. 3, pp. 228-36, 1937.
- (118) JACKSON, D. Orthogonal polynomials in three variables.
Duke Math. J., Vol. 4, pp. 441-54, 1938.

- (119) JEFFREYS, H. On the smoothing of observed data.
Proc. Camb. Phil. Soc., Vol. 33, pp. 444-50, 1937.
- (120) JEFFREYS, H. Significance tests for continuous departures from suggested distributions of chance.
Proc. Roy. Soc., A, Vol. 164, pp. 307-15, 1938.
- (121) JEFFREYS, H. Significance tests when several degrees of freedom arise simultaneously.
Proc. Roy. Soc., A, Vol. 165, pp. 161-98, 1938.
- (122) JEFFREYS, H. The law of errors and the combination of observations.
Phil. Trans., A, Vol. 237, pp. 231-71, 1938.
- (123) JEFFREYS, H. The use of minimum χ^2 as an approximation to the method of maximum likelihood.
Proc. Camb. Phil. Soc., Vol. 34, pp. 156-8, 1938.
- (124) JEFFREYS, H. Maximum likelihood, inverse probability and the method of moments.
Annals of Eugenics, Vol. VIII, pp. 146-51, 1938.
- (125) JEFFREYS, H. The correction of frequencies for a known standard error of observations.
Monthly Not. Roy. Astr. Soc., Vol. 98, pp. 190-4, 1938.
- (126) JORDAN, Ch. Sur l'approximation d'une fonction à plusieurs variables.
Acta Litt. Sci. Szeged, Vol. 8, pp. 205-25, 1937.
- (127) KENDALL, M. G. The conditions under which Sheppard's corrections are valid.
J. Roy. Stat. Soc., Vol. CI, pp. 592-605, 1938.
- (128) KENDALL, M. G. A new measure of rank correlation.
Biometrika, Vol. XXX, pp. 81-93, 1938.
- (129) KENDALL, M. G., KENDALL, S. F. H., and BABINGTON SMITH, B. The distribution of Spearman's coefficient of rank correlation in a universe in which all rankings occur an equal number of times.
Biometrika, Vol. XXX, pp. 251-73, 1939.
- (130) KERMACK, W. O., and McKENDRICK, A. G. Some distributions associated with a randomly arranged set of numbers.
Proc. Roy. Soc. Edinb., Vol. 57, pp. 332-76, 1937.
- (131) KERMACK, W. O., and McKENDRICK, A. G. Some properties of points arranged at random on a Mobius surface.
Math. Gazette, Vol. 22, pp. 66-72, 1938.
- (132) KERRICH, J. E. Least squares and a generalisation of the "Student"-Fisher theorem.
Skandinavisk Actuarietidskrift, pp. 244-51, 1937.

- (133) KHINTCHINE, A. Exemples des variables aléatoires obéissants à des lois stables.
Bull. Univ. État Moscou, Sér. Int., Sect. A.: Math. et Mécan., 1, Fasc. 5, pp. 6–8, 1937.
- (134) KHINTCHINE, A. Contribution à l'arithmétique des lois de distribution.
Bull. Univ. État Moscou, Sér. Int., Sect. A.: Math. et Mécan. 1, Fasc. 1, pp. 6–17, 1937.
- (135) KHINTCHINE, A. Dédution nouvelle d'une formule de M. Paul Lévy.
Bull. Univ. État Moscou, Sér. Int., Sect. A.: Math. et Mécan. 1, Fasc. 1, pp. 1–5, 1937.
- (136) KHINTCHINE, A. Invariante Klassen von Verteilungsgesetzen.
Bull. Univ. État Moscou, Sér. Int., Sect. A.: Math. et Mécan. 1, Fasc. 5, pp. 4–5, 1937.
- (137) KHINTCHINE, A. Zur Kennzeichnung der charakteristischen Funktionen.
Bull. Univ. État Moscou, Sér. Int., Sect. A.: Math. et Mécan. 1, Fasc. 5, pp. 1–3, 1937.
- (138) KHINTCHINE, A. Ueber Klassenkonvergenz von Verteilungsgesetzen.
Mitt. Forsch. Inst. Math. u. Mech. Univ. Tomsk, Vol. 1, pp. 258–61, 1937.
- (139) KOLMOGOROFF, A. Chaînes de Markoff avec une infinite dénombrable des états possibles.
Bull. Univ. Moscou, Sér. Int., Sect. A.: Math. et Mécan. 1, Fasc. 3, pp. 1–15, 1937.
- (140) KOSCHMIEDER, L. Ein Ausdruck, der die Hermite'schen Polynome der Ebene und die zu ihnen biorthogonalen auf einmal erzeugt.
Math. Zeitschrift, Vol. 43, pp. 783–92, 1938.
- (141) KOSCHMIEDER, L. Eine Erzeugende der Hermite'schen Polynome, deren Grundgebiet die Ebene ist.
Math. Zeitschrift, Vol. 43, pp. 248–54, 1937.
- (142) KOZAKIEWICZ, M. W. Sur les conditions nécessaires et suffisantes de la convergence stochastique.
Comptes Rendus, t. 205, pp. 1028–29, 1937.
- (143) KOZAKIEWICZ, M. W. Sur les conditions nécessaires et suffisantes pour la convergence stochastique.
Fundamenta Math., t. XXXI, pp. 160–78, 1938.
- (144) KRAFFT, M. Zwei Sätze aus Gauss' Theorie *combinationis observationum*.
Deutsche Math., Vol. 2, pp. 624–30, 1937.

- (145) KRALL, H. L. Certain differential equations for Tchebycheff polynomials.
Duke Math. J., Vol. 4, pp. 705–19, 1938.
- (146) KULLBACK, S. On certain distributions derived from the multinomial distribution.
Annals Math. Statistics, Vol. VIII, pp. 127–44, 1937.
- (147) LAGRANGE, R. Sur une famille de polynômes et certains développements de la fonction x^{-me^x} .
Acta Math., Vol. 69, pp. 1–19, 1938.
- (148) LAWLEY, D. N. A generalisation of Fisher's z -test.
Biometrika, Vol. XXX, pp. 180–7, 1938.
- (149) LAWLEY, D. N. A correction to "A generalisation of Fisher's z -test."
Biometrika, Vol. XXX, pp. 467–9, 1939.
- (150) LEDERMANN, W. Sampling distribution and selection in a normal population.
Biometrika, Vol. XXX, pp. 295–304, 1939.
- (151) LÉVY, P. Sur les exponentielles des polynômes et sur l'arithmétique des produits de lois de Poisson.
Annales de l'École Normale Sup., t. 54, pp. 231–92, 1937.
- (152) LÉVY, P. Complément à un théorème sur la loi de Gauss.
Bulletin Sci. Mathématiques, 2^e s., t. 61, pp. 115–28, 1937.
- (153) LÉVY, P. Sur certaines solutions de l'équation de Chapman.
Comptes Rendus, t. 205, pp. 1355–57, 1937.
- (154) LÉVY, P. Nouvelle contribution à l'arithmétique des produits de lois de Poisson.
Comptes Rendus, t. 205, pp. 535–37, 1937.
- (155) LÉVY, P. Sur la définition des lois de probabilité par leurs projections.
Comptes Rendus, t. 206, pp. 1240–2, 1938.
- (156) LÉVY, P. Rectification à une note antérieure.
Comptes Rendus, t. 206, p. 1699, 1938.
- (157) LÉVY, P. L'addition des variables aléatoires définies modulo un.
Comptes Rendus, t. 207, pp. 444–6, 1938.
- (158) LÉVY, P. L'arithmétique des lois de probabilité.
J. Math. Pure Appl., t. 27, pp. 17–40, 1938.
- (159) LINDBLAD, T. Zur Theorie der Korrelation bei mehr-dimensionalen zufälligen Variablen.
Acta Soc. Sci. Fennica, Ns. 2, Nr. 10, pp. 1–81, 1937.
- (160) LURQUIN, C. Sur la loi de Bernoulli à deux variables.
Bull. Classe des Sciences Acad. royale de Belgique, 5^e s., t. XXIII, pp. 857–60, 1937.
- (161) DE LURY, D. Note on correlations.
Annals Math. Statistics, Vol. IX, pp. 149–51, 1938.

- (162) MADOW, W. G. Contributions to the theory of comparative statistical analysis: I. Fundamental theorems of comparative analysis.
Annals Math. Statistics, Vol. VIII, pp. 159-76, 1937.
- (163) MADOW, W. G. Contributions to the theory of multivariate statistical analysis.
Trans. Amer. Math. Soc., Vol. XLIV, pp. 454-95, 1938.
- (164) MARCINKIEWICZ, J. Sur une propriété de la loi de Gauss.
Math. Zeitschrift, Vol. 44, pp. 612-19, 1938.
- (165) MARCINKIEWICZ, J., and ZYGMUND, A. Sur les fonctions indépendantes.
Fundamenta Math., Vol. 29, pp. 60-90, 1937.
- (166) MEISNER, J. Erzeugende Funktionen der Charlier'schen Polynome.
Math. Zeitschrift, Vol. 44, pp. 531-6, 1938.
- (167) MILICER-GRUZEWSKA, H. On the probable error of a function of a finite number of equivalent variables.
C.R. Soc. Sci. Varsovie, Vol. 30, pp. 1-9, 1937.
- (168) MISES, R. VON. Bestimmung einer Verteilung durch ihre ersten Momente.
Skandinavisk Actuarietidskrift, pp. 220-43, 1937.
- (169) MISES, R. VON. A modification of Bayes' problem.
Annals Math. Statistics, Vol. IX, pp. 256-9, 1938.
- (170) MISES, R. VON. Note on deduced probability distributions.
Bull. Amer. Math. Soc., Vol. 44, pp. 81-4, 1938.
- (171) MISES, R. DE. Sur une inégalité pour les moments d'une distribution quasi convexe.
Bull. Sci. Math., II, Vol. 62, pp. 68-71, 1938.
- (172) MORRISON, J. T. Note on the maximum correlation coefficient between two series whose values have been determined at equal intervals.
Phil. Mag., Vol. 24, pp. 240-5, 1937.
- (173) MOULTON, E. J. The periodic function obtained by repeated accumulation of a statistical series.
American Math. Monthly, Vol. XLV, pp. 583-6, 1938.
- (174) MOORE, T. V. Reduction of data showing non-linear regression for correlation by the ordinary product moment formula and the measurement of error due to linear regression.
J. Educ. Psych., Vol. XXVIII, pp. 205-14, 1937.
- (175) MUENCH, H. Discrete frequency distributions arising from mixtures of several single probability values.
J. Amer. Stat. Ass., Vol. 33, pp. 390-8, 1938.
- (176) NAIR, K. R. A note on the exact distribution of λ_n .
Sankhyā, Vol. 3, pp. 171-4, 1937.

- (177) NAIR, K. R. On Tippet's "random sampling numbers".
Proc. of the 1st Session of the Indian Statistical Conference, Calcutta, 1938, pp. 65-72, and *Sankhyā*, Vol. 4, pp. 65-72, 1938.
- (178) NAIR, U. S. The application of the moment function in the study of distribution laws in statistics.
Biometrika, Vol. XXX, pp. 274-94, 1939.
- (179) NEYMAN, J. "Smooth test" for goodness of fit.
Skandinavisk Actuarietidskrift, pp. 149-99, 1937.
- (180) NEYMAN, J. Outline of a theory of statistical estimation based on the classical theory of probability.
Phil. Trans., A., Vol. 236, pp. 333-81, 1937.
- (181) NEYMAN, J. A historical note on Karl Pearson's deduction of the moments of the binomial.
Biometrika, Vol. XXX, pp. 11-15, 1938.
- (182) NEYMAN, J. Contribution to the theory of sampling human populations.
J. Amer. Stat. Ass., Vol. 33, pp. 101-17, 1938.
- (183) NEYMAN, J. Tests of statistical hypotheses which are unbiased in the limit.
Annals Math. Statistics, Vol. IX, pp. 69-86, 1938.
- (184) NEYMAN, J. On statistics the distribution of which is independent of the parameters involved in the original probability law of the observed variables.
Statistical Research Memoirs, Dep. Stat. U. Lond., U. Coll., Vol. II, pp. 58-9, 1938.
- (185) NEYMAN, J., and PEARSON, E. S. Contribution to the theory of testing statistical hypotheses. Part II. Certain theorems on unbiased critical regions of type A. Part III. Unbiased tests of simple statistical hypotheses specifying the values of more than one unknown parameter.
Statistical Research Memoirs, Dep. Stat. U. Lond., U. Coll., Vol. II, pp. 25-57, 1938.
- (186) NORRIS, N. Some efficient measures of relative dispersion.
Annals Math. Statistics, Vol. IX, pp. 214-20, 1938.
- (187) NORRIS, N. Convexity properties of generalized mean value functions.
Annals Math. Statistics, Vol. VIII, pp. 118-20, 1937.
- (188) NORTON, K. A. Limits to the accuracy of estimated moment coefficients.
Sankhyā, Vol. 3, pp. 265-72, 1938.
- (189) OLDS, E. G. On the remainder in the approximate evaluation of the probability in the symmetrical case of James Bernoulli's theorem.
Bull. Amer. Math. Soc., Vol. 43, pp. 806-12, 1937.

- (190) OLDS, E. G. A note on the problem of estimation.
American Math. Monthly, Vol. XLIV, pp. 92-4, 1937.
- (191) OLDS, E. G. Distributions of sums of squares of rank differences for small numbers of individuals.
Annals Math. Statistics, Vol. IX, pp. 133-48, 1938.
- (192) OLLIVIER, A. On the analysis of variation in general death rates.
Metron, Vol. XIII, Part 2, pp. 155-72, 1938.
- (193) OLSHEN, C. A. Transformations of the Pearson Type III Distribution.
Annals Math. Statistics, Vol. IX, pp. 176-200, 1938.
- (194) ONICESCU, O., and MIHOC, G. L. L'allure asymptotique de la somme des variables d'une chaîne de Markoff discontinue.
Comptes Rendus, t. 205, pp. 481-82, 1937.
- (195) ONICESCU, O., and MIHOC, G. Sur une suite d'urnes disposées en cercle.
Ann. Sci. Univ. Jassy, I Math., Vol. 24, pp. 349-56, 1938.
- (196) OTTESTAD, P. On some discontinuous frequency functions and frequency distributions.
Skandinavisk Actuarietidskrift, pp. 75-86, 1937.
- (197) PEARSON, E. S. The probability integral transformation for testing goodness of fit and combining independent tests of significance.
Biometrika, Vol. XXX, pp. 134-48, 1938.
- (198) PEARSON, E. S. Note on Professor Pitman's contribution to the theory of estimation.
Biometrika, Vol. XXX, pp. 471-4, 1939.
- (199) PEEK, R. L. Test of an observed difference in the frequency of two results.
J. Amer. Stat. Ass., Vol. 32, pp. 532-6, 1937.
- (200) PERSIDSKIJ, R. Ueber das Gesetz der grossen Zahlen.
C.R. Acad. Sci. U.R.S.S., Vol. 18, pp. 81-3, 1938.
- (201) PITMAN, E. J. G. Significance tests which may be applied to samples from any population. II. The correlation coefficient test.
J. Roy. Stat. Soc. Suppl., Vol. IV, pp. 225-32, 1937.
- (202) PITMAN, E. J. G. Significance tests which may be applied to samples from any populations. III. The analysis of variance test.
Biometrika, Vol. XXX, pp. 322-35, 1938.
- (203) PITMAN, E. J. G. The estimation of the location and scale parameters of a continuous population of any given form.
Biometrika, Vol. XXX, pp. 391-421, 1939.

- (204) PÓLYA, G. Sur l'indétermination d'une problème voisine du problème des moments.
Comptes Rendus, t. 207, pp. 707-8, 1938.
- (205) POTOČEK, J. Une remarque sur les chaînes de Markoff réversibles.
Comptes Rendus, t. 206, pp. 1536-8, 1938.
- (206) QUENSEL, C. E. The distributions of the second moment and of the correlation coefficient in samples from populations of type A.
Lunds Univ. Arsskr., N.F. 34, 4, pp 1-111, 1938.
- (207) RAIKOV, D. On the decomposition of Gauss and Poisson laws.
Bull. Acad. Sci. U.R.S.S., Sér. Math., Vol. 1, pp. 91-120, 1938.
- (208) REICHENBACH, H. Les fondements logiques du calcul des probabilités.
Annales de l'Institut Henri Poincaré, Vol. VII, pp. 267-348, 1937.
- (209) RICE, S. O. Van Uven's theorem in probability theory and a self-reciprocal Hankel transform.
Quart. J. Maths., Vol. 9, pp. 1-4, 1938.
- (210) RICKER, W. E. Fiducial limits of the Poisson frequency distribution.
J. Amer. Stat. Ass., Vol. 32, pp. 349-56, 1937.
- (211) RIETZ, H. L. On a recent advance in statistical inference.
American Math. Monthly, Vol. XLV, pp. 149-59, 1938.
- (212) RIORDAN, J. Moment recurrence relations for binomial, Poisson and hypergeometric frequency distributions.
Annals Math. Statistics, Vol. VIII, pp. 103-11, 1937.
- (213) RISSELMAN, W. C. Approximation to a given function by means of polynomials in another given function.
Bull. Amer. Math. Soc., Vol. 44, pp. 241-9, 1938.
- (214) ROMANOVSKY, V. Généralisation du système des courbes de Pearson.
Act. Univ. Asiæ Mediæ, Ser. V-a, fasc. 15, pp. 3-33, 1937.
- (215) ROSS, R. T. A statistic for circular scales.
J. Educ. Psych., Vol. XXIX, pp. 384-90, 1938.
- (216) ROY, S. N. A geometrical note on the use of rectangular co-ordinates in the theory of sampling distributions connected with a multivariate normal population.
Sankhyā, Vol. 3, pp. 273-84, 1938.
- (217) SAKURAI, T. On sets of some non-orthogonal functions.
Tohoku Math. J., Vol. 44, pp. 94-114, 1938.
- (218) SAVUR, S. R. The use of the median in tests of significance.
Proc. Indian Acad. Sci., A, Vol. V, pp. 564-76, 1937.

- (219) SAVUR, S. R. A problem in coin tosses.
Proc. Phys. Soc., Vol. 50, pp. 947-60, 1938.
- (220) SAVUR, S. R. A note on the arrangement of incomplete blocks, when $K = 3$ and $\lambda = 1$.
Annals of Eugenics, Vol. IX, pp. 45-9, 1939.
- (221) SCHELLING, H. VON. Zur Beurteilung von Stichproben.
Astron. Nachr., Vol. 264, pp. 29-32, 1937.
- (222) SCHUMANN, T. E. W. A general graduation formula for the smoothing of time series.
Phil. Mag., Vol. 26, pp. 970-83, 1938.
- (223) SEGAL, J. E. Fiducial distribution of several parameters with application to a normal system.
Proc. Camb. Phil. Soc., Vol. 34, pp. 41-7, 1938.
- (224) SHIH, Y. H. Statistical theory of successive occurrence and its several applications.
Proc. Phys.-Math. Soc. Japan, III, s. 19, pp. 487-502, 1937.
- (225) SILBERSTEIN, L. Short derivation of a fundamental probability formula.
Phil. Mag., Vol. 26, pp. 223-4, 1938.
- (226) SIMS, V. M. A note on scoring the rearrangement test.
J. Educ. Psych., Vol. XXVIII, pp. 302-4, 1937.
- (227) SIMONSEN, W. On the distributions of certain functions of samples from a multivariate infinite population.
Skandinavisk Actuarietidskrift, Vol. 20, pp. 200-19, 1937.
- (228) SMIRNOFF, N. Sur la dépendance des membres d'une série de variations.
Bull. Univ. État Moscou, Sér. Int., Sect. A.: Math. et Mécan., Fasc. 4, pp. 1-12, 1937.
- (229) STARKEY, D. M. A test of significance of the difference between means of samples from two normal populations without assuming equal variances.
Annals Math. Statistics, Vol. IX, pp. 201-14, 1938.
- (230) STEFFENSEN, J. F. On the semi-normal distribution.
Skandinavisk Actuarietidskrift, pp. 60-74, 1937.
- (231) STEVENS, W. L. The truncated normal distribution.
Annals Appl. Biol., Vol. 24, pp. 847-50, 1937.
- (232) STEVENS, W. L. Significance of grouping.
Annals of Eugenics, Vol. VIII, pp. 57-69, 1937.
- (233) STEVENS, W. L. The distribution of entries in a contingency table with fixed marginal totals.
Annals of Eugenics, Vol. VIII, pp. 238-44, 1938.
- (234) STEVENS, W. L. The completely orthogonalized Latin square.
Annals of Eugenics, Vol. IX, pp. 82-93.

- (235) STEVENS, W. L. Distribution of groups in a sequence of alternatives.
Annals of Eugenics, Vol. IX, pp. 10-18, 1939.
- (236) SUKHATME, P. V. Tests of significance for samples of the χ^2 -population with two degrees of freedom.
Annals of Eugenics, Vol. VIII, pp. 52-6, 1937.
- (237) SUKHATME, P. V. The problem of k -samples for Poisson population.
Proc. Nat. Inst. Sci. India, Vol. 3, pp. 297-305, 1937.
- (238) SUKHATME, P. V. On bipartitional functions.
Phil. Trans., A., Vol. 237, pp. 375-409, 1938.
- (239) SUKHATME, P. V. On the distribution of χ^2 in samples of the Poisson series.
J. Roy. Stat. Soc. Suppl., Vol. V, pp. 75-9, 1938.
- (240) SUKHATME, P. V. On Fisher's combinatorial methods giving moments and cumulants of the distributions of k -statistics.
Proc. of the 1st Session of the Indian Statistical Conference Calcutta, 1938, pp. 53-64, and *Sankhyā*, Vol. 4, pp. 53-64, 1938.
- (241) SUKHATME, P. V. On Fisher and Behrend's test of significance for the difference in means of two normal samples.
Proc. of the 1st Session of the Indian Statistical Conference, Calcutta, 1938, pp. 39-48, and *Sankhyā*, Vol. 4, pp. 39-48, 1938.
- (242) TANG, P. C. The power function of the analysis of variance tests with tables and illustrations of their use.
Statistical Research Memoirs, Dep. Stat. U. Lond., U. Coll., Vol. II, pp. 126-49, 1938.
- (243) THORNDIKE, E. L. On correlations between measurements which are not normally distributed.
J. Educ. Psych., Vol. XXVIII, pp. 367-70, 1937.
- (244) TILTON, J. W. The measurement of overlapping.
J. Educ. Psych., Vol. XXVIII, pp. 656-62, 1937.
- (245) TORNIER, E. Zur Erzeugung einer Versuchsvorschrift aus einem anderen durch formale Abänderung.
Deutsche Math., Zweiter Jahrgang, pp. 466-9, 1937.
- (246) TORNIER, E. Verallgemeinerung des Rückschluss-Satzes der Wahrscheinlichkeitsrechnung.
Deutsche Math., Zweiter Jahrgang, pp. 469-73, 1937.
- (247) TRIKOMI, F. Les transformations de Fourier, Laplace, Gauss et leurs applications au calcul des probabilités et à la statistique.
Annales de l'Institut Henri Poincaré, Vol. VIII, pp. 111-47, 1938.

- (248) UNO, P. Théorème ergodique dans les phénomènes statistiques héréditaires.
Proc. Phys.-Math. Soc. Jap., Vol. III, s. 19, pp. 650-6, 1937.
- (249) VANDIVER, H. S. On sum of products of binomial coefficients.
American Math. Monthly, Vol. XLV, pp. 369-72, 1938.
- (250) VISSER, C. The law of nought-or-none in the theory of probability.
Studia Math., t. VII, pp. 143-49, 1938.
- (251) WALD, A. Die Widerspruchsfreiheit des Kollektivbegriffs der Wahrscheinlichkeitsrechnung.
Ergebn. math. Kolloqu., Hamburg, 8, pp. 38-72, 1937.
- (252) WALD, A. A generalization of Markoff's inequality.
Annals Math. Statistics, Vol. IX, pp. 244-56, 1938.
- (253) WATSON, G. N. A note on the polynomials of Hermite and Laguerre.
J. Lond. Math. Soc., Vol. 13, pp. 204-10, 1938.
- (254) WEBSTER, M. S. On the zeros of Jacobi polynomials with applications.
Duke Math. J., Vol. 3, pp. 426-42, 1937.
- (255) WEBSTER, M. S. Orthogonal polynomials with orthogonal derivations.
Bull. Amer. Math. Soc., Vol. 44, pp. 880-8, 1938.
- (256) WELCH, B. L. On tests for homogeneity.
Biometrika, Vol. XXX, pp. 149-58, 1938.
- (257) WELCH, B. L. The significance of the difference between two means when the population variances are unequal.
Biometrika, Vol. XXIX, pp. 350-62, 1938.
- (258) WERTHEIMER, A. Note on Zoch's paper on the postulate of the arithmetic mean.
Annals Math. Statistics, Vol. VIII, pp. 112-15, 1937.
- (259) WILKS, S. S. The analysis of variance for two or more variables.
Third Ann. Res. Conf. Econ. Stat. Colorado Springs, U.S.A., 1937, pp. 82-5, 1937.
- (260) WILKS, S. S. The large-sample distribution of the likelihood ratio for testing composite hypotheses.
Annals Math. Statistics, Vol. IX, pp. 60-3, 1938.
- (261) WILKS, S. S. Shortest confidence intervals from large samples.
Annals. Math. Statistics, Vol. IX, pp. 166-75, 1938.
- (262) WILKS, S. S. Fiducial distributions in fiducial inference.
Annals Math. Statistics, Vol. IX, pp. 272-80, 1938.

- (263) WILKS, S. S. Weighting systems for linear functions of correlated variables when there is no dependent variable.
Psychometrika, Vol. 3, pp. 23-40, 1938.
- (264) WILKS, S. S. The analysis of variance and covariance in non-orthogonal data.
Metron, Vol. XIII, Part 2, pp. 141-54, 1938.
- (265) WISNIEWSKI, J. K. A problem in "least squares."
Annals Math. Statistics, Vol. VIII, pp. 145-9, 1937.
- (266) YATES, F. Orthogonal functions and tests of significance in the analysis of variance.
J. Roy. Stat. Soc. Suppl., Vol. V, pp. 177-80, 1938.
- (267) YULE, G. U. On some properties of normal distributions univariate and bivariate, based on sums of squares of frequencies.
Biometrika, Vol. XXX, pp. 1-10, 1938.
- (268) ZAYCOFF, R. Über die Ausschaltung der zufälligen Komponente nach der Variate-difference-Methode
Publ. Stat. Inst. Econ. Res. State Univ. Sofia, 1937.
- (269) ZOCH, R. T. Reply to Mr. Wertheimer's paper.
Annals of Math. Statistics, Vol. VIII, pp. 117-18, 1937.

III. APPLICATIONS

A. AGRICULTURAL

- (1) BALD, J. G. Investigations on "Spotted Wilt" of tomatoes.
III. Infection in field plots.
J. Council Sci. Ind. Res. Australia Bul. 106, 1937.
- (2) BALD, J. G. The use of numbers of infections for comparing the concentration of plant virus suspensions.
Annals Appl. Biol., Vol. 24, pp. 33-54, 1937.
- (3) BARTLETT, M. S. Some examples of statistical methods of research in agriculture and applied biology.
J. Roy. Stat. Soc. Suppl., Vol. IV, pp. 137-83, 1937.
- (4) BARTLETT, M. S. The approximate recovery of information from replicated experiments with large blocks.
J. Agric. Sci., Vol. XXVIII, pp. 418-27, 1938.
- (5) BEALE, G. Methods of estimating the population of insects in a field.
Biometrika, Vol. XXX, pp. 422-39, 1939.
- (6) BLISS, C. I. The calculation of the time mortality curve.
Annals Appl. Biol., Vol. 24, pp. 816-42, 1937.

- (7) BOSE, S. S., and MAHALANOBIS, P. C. On estimating individual yields in the case of mixed up yields of two or more plots in field experiments.
Proc. of the 1st Session of the Indian Statistical Conference, Calcutta, 1938, pp. 103-20, and *Sankhyā*, Vol. 4, pp. 103-20, 1938.
- (8) BOYDEN, C. J. A method of predicting night minimum temperatures.
Q.J. Roy. Met. Soc., Vol. 63, pp. 383-89.
- (9) BUSVINE, J. R. The toxicity of ethylene oxide.
Annals Appl. Biol., Vol. 25, pp. 605-30, 1938.
- (10) BYWATERS, J. H. Weight variance in pigs.
Genetics, Vol. XXII, pp. 457-68, 1937.
- (11) COCHRAN, W. G. Some difficulties in the statistical analysis of replicated experiments.
Empire J. Exp. Agric., Vol. VI, pp. 157-75, 1938.
- (12) COCHRAN, W. G. Appendix to "The problem of the evaluation of rotenone-containing plants." IV. By F. Tattersfield and J.-T. Martin.
Annals Appl. Biol., Vol. 25, p. 426, 1938.
- (13) COCHRAN, W. G. Appendix to "Field experiments on the control of Wireworms" by W. R. S. Ladell.
Annals Appl. Biol., Vol. 25, pp. 383-9, 1938.
- (14) CURRY, J. R., and FONS, W. L. Rate of spread of surface fires in the Ponderosa Pine Type of California.
Journ. Agric. Res., Vol. 57, pp. 239-68, 1938.
- (15) DUERR, W. A., and GEVORKIANTZ, S. R. Growth prediction and site determination in uneven-aged timber stands.
J. Agric. Res., Vol. 56, pp. 81-98, 1938.
- (16) ELSASSER, W. M. New values for the infra-red absorption coefficient of atmospheric water vapor.
Month. Weather Rev., Vol. 66, pp. 175-81, 1938.
- (17) GOULDEN, C. H. Modern methods for testing a large number of varieties.
Dom. Canada Dep. Agric. Technical Bull. 9, 1937.
- (18) GUMBEL, E. J. La prévision des inondations.
Comptes Rendus, t. 206, pp. 558-60, 1938.
- (19) GUMBEL, E. J. La distribution des inondations.
Akt. Vedy Roč, Vol. VII, pp. 85-92, 1938.
- (20) HAMMOND, J. C., HENDRICKS, W. A., and TITUS, H. W. Effect of percentage of protein in the diet on growth and feed utilization of male chickens.
J. Agric. Res., Vol. 56, pp. 791-810, 1938.

- (21) HASEL, A. H. Sampling error in timber surveys.
J. Agric. Res., Vol. 57, pp. 713-36, 1938.
- (22) HENDRICKS, W. A. A criterion for testing the accuracy of trap nest records.
J. Agric. Res., Vol. 54, pp. 461-4, 1937.
- (23) HOBLYN, P. N. A study of the variation in keeping quality of apples in store: As illustrated by the behaviour of the variety McIntosh Red from an Ontario apple orchard.
J. Roy. Stat. Soc. Suppl., Vol. V, pp. 129-70, 1938.
- (24) JOHNSON, B. A photoelectric sorter for length measurements of fibers of seed cotton.
J. Agric. Res., Vol. 57, pp. 41-56, 1938.
- (25) IMMER, F. R. Correlation between means and standard deviations in field experiments.
J. Amer. Stat. Ass., Vol. 32, pp. 525-31, 1937.
- (26) IRWIN, J. O., COCHRAN, W. G., and WISHART, J. Crop estimation and its relation to agricultural meteorology.
J. Roy. Stat. Soc. Suppl., Vol. V, pp. 1-45, 1938.
- (27) LISTER, P. B., and SCHUMACHER, F. X. The influence of rainfall upon tuft area and height growth of three semi-desert range grasses in Southern Arizona.
J. Agric. Res., Vol. 54, pp. 109-22, 1937.
- (28) MACKINNEY, A. L., SCHUMACHER, F. X., and CHAIKEN, L. E. Construction of yield-tables for non-normal loblolly pine stands.
J. Agric. Res., Vol. 54, pp. 531-46, 1937.
- (29) MAHALANOBIS, P. C. A note on the influence of lunar phase on the rainfall in the month of July in Calcutta.
Sankhyā, Vol. 3, pp. 233-8, 1938.
- (30) MEYERS, M. T., and PATCH, L. H. A statistical study of sampling in field surveys of the fall population of the European Corn Borer.
J. Agric. Res., Vol. 55, pp. 849-71, 1937.
- (31) NAIR, K. R. On a method of getting confounded arrangements in the general symmetrical type of experiment.
Proc. of the 1st Session of the Indian Stat. Conference, Calcutta, 1938, pp. 121-38, and *Sankhyā*, Vol. 4, pp. 121-38, 1938.
- (32) NEYMAN, J., and PEARSON, E. S. Note on some points in "Student's" paper on "Comparison between balanced and random arrangements of field plots."
Biometrika, Vol. XXIX, pp. 380-8, 1938.

- (33) PEARSON, E. S. Some aspects of randomization. II. An illustration of "Student's" inquiry into the effect of "balancing" in agricultural experiments.
Biometrika, Vol. XXX, pp. 159-79, 1938.
- (34) VAN REST, E. D. Examples of statistical methods in Forest Products Research.
J. Roy. Stat. Soc. Suppl., Vol. IV, pp. 184-209, 1937.
- (35) SCHNABEL, L. E. Estimation of total fish population of a lake.
American Math. Monthly, Vol. XLV, pp. 348-52, 1938.
- (36) SMITH, H. F. An empirical law describing heterogeneity in the yields of agricultural crops.
J. Agric. Sci., Vol. XXVIII, pp. 1-23, 1938.
- (37) SMITH, H. F. Report of a preliminary statistical investigation of flowering dates of plants recorded in the Phenological Report of the Royal Meteorological Society.
Q.J. Roy. Met. Soc., Vol. 64, pp. 23-46, 1938.
- (38) SMITH, H. F. The variability of plant density in fields of wheat and its effect on yield.
J. Council Sci. Ind. Res. Australia, Bull. 109, 1937.
- (39) "STUDENT." Comparison between balanced and random arrangements of field plots.
Biometrika, Vol. XXIX, pp. 361-79, 1938.
- (40) TANG, Y. Certain statistical problems arising in plant breeding.
Biometrika, Vol. XXX, pp. 29-56, 1938.
- (41) YATES, F. Applications of the sampling technique to crop estimation and forecasting.
Trans. Manchester Stat. Soc., Session 1936-7.
- (42) YATES, F. The comparative advantages of systematic and randomized arrangements in the design of agricultural and biological experiments.
Biometrika, Vol. XXX, pp. 440-66, 1939.
- (43) YATES, F., and COCHRAN, W. G. The analysis of groups of experiments.
J. Agric. Sci., Vol. XXVIII, pp. 556-80, 1938.
- (44) VERNON, M., and ASHBURN, E. V. A practical method of computing winds aloft from pressure and temperature fields.
Month. Weather Rev., Vol. 66, pp. 267-74, 1938.
- (45) WATSON, D. J. The estimation of leaf area in field crops.
J. Agric. Sci., Vol. XXVII, pp. 474-83, 1937.
- (46) WATSON, D. J., and BAPTISTE, E. C. D. A comparative physiological study of sugar beet and mangolds with respect to growth and sugar accumulation.
Annals Bot. N.S. 2, pp. 438-79, 1938.

- (47) WEST, O. The significance of percentage area determinations yielded by the percentage area or density list method of pasture analysis.
Journal Ecology, Vol. 26, pp. 210-17, 1938.
- (48) WISHART, J. Field experiments of factorial design.
J. Agric. Sci., Vol. XXVIII, pp. 299-306, 1938.
- (49) WISHART, J. Growth-rate determinations in nutrition studies with the bacon pig and their analysis.
Biometrika, Vol. XXX, pp. 15-28, 1938.

B. GENETICAL

- (1) BARTLETT, M. S. Deviations from expected frequencies in the theory of inbreeding.
J. Genetics, Vol. 35, pp. 83-7, 1938.
- (2) BEDICHEK, S., and HALDANE, J. B. S. A search for autosomal recessive lethals in man.
Annals of Eugenics, Vol. VIII, pp. 245-54, 1938.
- (3) BELL, J., and HALDANE, J. B. S. The linkage between the genes of colour-blindness and haemophilia in man.
Proc. Roy. Soc. B, Vol. 123, pp. 119-50, 1937.
- (4) BURKS, B. S. Autosomal linkage in man—The recombination ratio between congenital tooth deficiency and hair-colour.
Proc. Nat. Acad. Sci., Vol. 24, pp. 512-19, 1938.
- (5) CHARLES, D. R. The spatial distribution of cross overs in X-chromosome tetrads of *Drosophila Melanogaster*.
J. Genetics, Vol. 36, pp. 103-25, 1938.
- (6) COTHERMAN, C. W., and SNYDER, L. H. Studies in human inheritance XVII. The gene frequency analysis of double recessive inheritance involving one autosomal and one sex linked gene-substitution.
Genetica, Vol. XIX, pp. 537-52, 1937.
- (7) FFOULKES, EDWARDS J., and ETHERINGTON, J. M. H. Blood-group inheritance.
Nature, Vol. 141, p. 246, 1938.
- (8) FISHER, R. A. Dominance in poultry. Feathered feet, rose comb, internal pigment and pile.
Proc. Roy. Soc., B., Vol. 125, pp. 25-48, 1938.
- (9) FISHER, R. A. The precision of the product formula for the estimation of linkage.
Annals of Eugenics, Vol. IX, pp. 50-4, 1939.
- (10) FISHER, R. A., and GRAY, H. Inheritance in man: Boas's data studied by the method of analysis of variance.
Annals of Eugenics, Vol. VIII, pp. 79-93, 1937.

- (11) HALDANE, J. B. S. Some theoretical results of continued brother-sister mating.
J. Genetics, Vol. 34, pp. 265-74, 1937.
- (12) HALDANE, J. B. S. Indirect evidence for the mating system in natural populations.
J. Genetics, Vol. 36, pp. 213-20, 1938.
- (13) HALDANE, J. B. S. The location of the gene for Haemophilia.
Genetica, Vol. XX, pp. 423-9, 1938.
- (14) HALDANE, J. B. S. The estimation of the frequencies of recessive conditions in man.
Annals of Eugenics, Vol. VIII, pp. 255-62, 1938.
- (15) DE KÖRÖSY, R. Transitive interference in gene linkage.
Nature, Vol. 140, p. 322, 1938.
- (16) KOSTIZIN, V. A. Sur les coefficients mendéliens d'hérédité.
Comptes Rendus, t. 206, pp. 883-5, 1938.
- (17) KOSTIZIN, V. A. Sur les équations différentielles du problème de la sélection naturelle dans le cas de mutation d'un chromosome sexuel.
Comptes Rendus, t. 206, pp. 1273-6, 1938.
- (18) LEVIT, S. G. Genetical analysis of selected human data bearing on the genetics of hermaphroditism.
J. Genetics, Vol. 35, pp. 151-9, 1938.
- (19) MALÉCOT, G. Sur l'analyse des aléatoires et le problème de l'hérédité.
Comptes Rendus, t. 206, pp. 153-5, 1938.
- (20) MALÉCOT, G. Sur les aléatoires mendéliennes et les corrélations de l'hérédité.
Comptes Rendus, t. 206, pp. 404-6, 1938.
- (21) MATHER, K. The analysis of single-factor segregations.
Annals of Eugenics, Vol. VIII, pp. 96-105, 1937.
- (22) NORTON, H. W. Optimum estimation of frequency of heterozygotes.
Annals of Eugenics, Vol. VIII, pp. 402-6, 1938.
- (23) PENROSE, L. S. Genetic linkage in graded human characters.
Annals of Eugenics, Vol. VIII, pp. 233-8, 1938.
- (24) SIRKS, M. J. Haemophilia as a proof for mutation in man.
Genetica, Vol. XIX, pp. 417-22, 1937.
- (25) SMITH, F. H. The test of significance for Mendelian ratios when classification is uncertain.
Annals of Eugenics, Vol. VIII, pp. 94-5, 1937.
- (26) STEVENS, W. L. Estimation of blood-group gene frequencies.
Annals of Eugenics, Vol. VIII, pp. 362-75, 1938.
- (27) STEVENS, W. L. A test for uniovular twins in mice.
Annals of Eugenics, Vol. VIII, pp. 70-3, 1937.

- (28) TAYLOR, G. L., and PRIOR, A. M. Blood groups in England. II. Distribution in the population.
Annals of Eugenics, Vol. VIII, pp. 356-61, 1938.
- (29) TAYLOR, G. L., and PRIOR, A. M. Blood groups in England. III. Discussion of the family material.
Annals of Eugenics, Vol. IX, pp. 18-44, 1938.
- (30) WRIGHT, S. The distribution of gene frequencies in populations.
Science, New York, vol. 85, p. 504, 1937.
- (31) WRIGHT, S. The distribution of gene frequencies in populations of polyploids.
Proc. Nat. Acad. Sci., Vol. 24, pp. 372-7, 1938.
- (32) WRIGHT, S. The distribution of gene frequencies under irreversible mutation.
Proc. Nat. Acad. Sci., Vol. 24, pp. 253-60, 1938.

C. POPULATION AND ACTUARIAL STUDIES

- (1) BENTLING, K. Die unabhängigen Wahrscheinlichkeiten in der Versicherungsmathematik und ihr Verhältnis zu den abhängigen.
Dissert. Berlin Univ., 1938.
- (2) BOEHM, C. Sicherheitsreserve und Rückversicherung in der Lebensversicherung.
Versicherungs-Mathematik, B.4, pp. 41-69, 1937.
- (3) BRAUN, H. Von der makrophysikalischen Auffassung des Sterbegeschehens zur quanten theoretischen Auffassung.
Versicherungs-Wissenschaft, B.38, pp. 297-306, 1938.
- (4) CARROLL, J. A. An application of Fourier Transforms to the evaluation of a class of repeated integrals arising in calculations of probability.
Quant. J. Maths., Vol. 9, pp. 176-81, 1938.
- (5) DELAPORTE, P. Évolution de la mortalité française depuis un siècle.
J. Société Stat. Paris 79^e Année, pp. 181-205, 1938.
- (6) DEPOIS, P. Mortalité par état matrimonial. Dissolution des unions suivant la durée et l'âge combiné des deux époux.
J. Société Stat. Paris 79^e Année, pp. 77-91 and pp. 100-10, 1938.
- (7) DOERING, C. R., and FORBES, A. L. A skeleton life table.
Proc. Nat. Acad. Sci., Vol. 24, pp. 400-5, 1938.
- (8) DUBOURDIEU, J. Les fonctions absolument monotones et la théorie mathématique de l'assurance-accidents.
Comptes Rendus, t. 206, pp. 556-7, 1938.

- (9) DUBOURDIEU, J. Remarques relatives à la théorie de l'assurance-accidents.
Comptes Rendus, t. 206, pp. 303-5, 1938.
- (10) GUMBEL, E. J. Les centénaires.
Akt. Vědy Roč. VII, pp. 1-8, 1937.
- (11) HADWIGER, H. Ein Konvergenzkriterium für Erneuerungszahlen.
Skandinavisk Actuarietidskrift, pp. 226-36, 1938.
- (12) HADWIGER, H. Ueber die Entwicklung der Erneuerungsfunktion in eine Potenzreihe.
Skandinavisk Actuarietidskrift, pp. 31-7, 1938.
- (13) HEUBECK, G. Beiträge zur mathematischen Theorie des Bau-sparens.
Versicherungs-Mathematik, B.4, pp. 171-95, 1938.
- (14) JECKLIN, H. Die einjährige Sterbenswahrscheinlichkeit als Hilfsgrösse zur Bestimmung des technischen Durchschnittsalters von Personengruppen in der Lebensversicherung.
Versicherungs-Mathematik, B.4, pp. 235 78, 1938.
- (15) KEYFITZ, N. Graduation by a truncated normal.
Annals Math. Statistics, Vol. IX, pp. 66 8, 1938.
- (16) KUCZYNSKI, R. R. The analysis of vital statistics. I. Marriage statistics.
Economica, Vol. 5, pp. 138-63, 1938.
- (17) KUCZYNSKI, R. R. The analysis of vital statistics. II. birth and death statistics.
Economica, Vol. 5, pp. 289-316, 1938.
- (18) LIDSTONE, G. J. Some properties of Makeham's second law of mortality and the double and triple geometric laws.
J. Inst. Actuaries, Vol. LXVIII, pp. 535-40, 1937.
- (19) LOTKA, A. J. Some recent results in population analysis.
J. Amer. Stat. Ass., Vol. 33, pp. 164-78, 1938.
- (20) MAHR, W. Zum Begriff der Schadenwahrscheinlichkeit.
Versicherungs-Wissenschaft, Vol. 37, pp. 310-22, 1937.
- (21) MARCHAND, E. Probabilités expérimentales, probabilités corrigées et probabilités indépendantes.
Mitteilungen d. Vereinigung schweiz. Versicherungs-Math., H.33, pp. 49-67, 1937.
- (22) MARTIN, W. J., and CHEESEMAN, E. A. Rural mortality. Its comparative sex incidence.
Biometrika, Vol. XXX, pp. 57 64, 1938.
- (23) NYBØLLE, H. C. On an attempt to reduce infant mortality.
J. Amer. Stat. Ass., Vol. 32, pp. 489-517, 1937.

- (24) O'BRIEN, H., and CAMERON, J. A. The application of uniform juniority to a mortality table graduated by the multiple geometric law.
J. Inst. Actuaries, Vol. LXVIII, pp. 541-53, 1937.
- (25) OLIFIERS, C. Graduation by double geometric laws supplementary to Makeham's basic curve. With an application to the graduation of the A 1924-29.
J. Inst. Actuaries, Vol. LXVIII, pp. 526-34, 1937.
- (26) SWAROOP, S., and LAL, R. B. Logistic law of growth and structure of Indian population.
Population, Vol. II, pp. 100-21, 1938.
- (27) WILSON, C. B. The standard deviation of sampling for life expectancy.
J. Amer. Stat. Ass., Vol. 33, pp. 705-8, 1938.
- (28) WINKLER, W. Einige alte und neue Masse des natürlichen Bevölkerungs-Wachstums.
Rev. L'Institut Intern. Stat., 6 Année, pp. 307-20, 1938.

D. PSYCHOLOGICAL

- (1) ADKINS, D. C., and TOOPS, H. A. Simplified formulas for item selection and construction.
Psychometrika, Vol. 2, pp. 165-72, 1937.
- (2) ARSENIAN, S. The Spearman visual perception test (Part II) with Pantomime directions.
Brit. J. Educ. Psych., Vol. VII, pp. 287-302, 1937.
- (3) BARTLETT, M. S. The statistical conception of mental factors.
Brit. J. Psych., Vol. XXVIII, pp. 97-104, 1937.
- (4) BARTLETT, M. S. Methods of estimating mental factors.
Nature, Vol. 141, p. 609, 1938.
- (5) BIRTWISTLE, J. A. The work curve and the work decrement.
Brit. J. Psych., Vol. XXVIII, pp. 315-20, 1937.
- (6) BURKS, B. S. On the relative contributions of nature and nurture to average group differences in intelligence.
Proc. Nat. Acad. Sci., Vol. 24, pp. 276-82, 1938.
- (7) BURT, C. Correlations between persons.
Brit. J. Psych., Vol. XXVIII, pp. 59-96, 1937.
- (8) BURT, C. Methods of factor analysis with and without successive approximation.
Brit. J. Educ. Psych., Vol. VII, pp. 172-95, 1937.
- (9) BURT, C. The analysis of temperament.
Brit. J. Medical Psych., Vol. XVII, pp. 158-88, 1938.
- (10) BURT, C. The unit Hierarchy and its properties.
Psychometrika, Vol. 3, pp. 151-68, 1938.

- (11) DODGE, A. F. Relation of social dominance to general intelligence.
J. Educ. Psych., Vol. XXVIII, pp. 387-90, 1937.
- (12) DWYER, P. S. The determination of the factor loadings of other tests.
Psychometrika, Vol. 2, pp. 173-9, 1937.
- (13) DWYER, P. S. The use of subcorrelation in determining the predictive power of High School grades.
J. Educ. Psych., Vol. XXVIII, pp. 673-80, 1937.
- (14) FOREST, R. Essai d'étude statistique sur les tests mentaux.
J. Société Stat. Paris 79^e Année, pp. 206-23, 1938.
- (15) FRASER-ROBERTS, I. A., and GRIFFITHS, R. Studies on a child population. II. Retests on the advanced Otis and Stanford-Binet scales, with notes on the use of a shortened Binet-scale.
Annals of Eugenics, Vol. VIII, pp. 15-45, 1937.
- (16) FRASER-ROBERTS, I. A., NORMAN, R. M., and GRIFFITHS, R. Studies on a child population. III. Intelligence and family size.
Annals of Eugenics, Vol. VIII, pp. 178-215, 1938.
- (17) FRASER-ROBERTS, I. A., NORMAN, R. M., and GRIFFITHS, R. Studies on a child population. IV. The form of the lower end of the frequency distribution of Stanford-Binet intelligence quotients and the fall of low intelligence quotients with advancing age.
Annals of Eugenics, Vol. VIII, pp. 319-36, 1938.
- (18) GASKILL, H. V., and COX, G. M. Patterns in emotional reactions. I. Respiration, the use of analysis of variance and co-variance in psychological data.
J. General Psych., Vol. 16, pp. 21-38, 1937.
- (19) GREENWOOD, J. A. Variance of a general matching problem.
Annals Math. Statistics, Vol. IX, pp. 48-56, 1938.
- (20) GUILFORD, J. P. The Psychophysics of mental test difficulty.
Psychometrika, Vol. 2, pp. 107-20, 1937.
- (21) GUILFORD, J. P. Scale values derived from the method of choices.
Psychometrika, Vol. 2, pp. 139-50, 1937.
- (22) HARMAN, H. H. Systems of regression equations for the estimation of factors.
J. Educ. Psych., Vol. XXIX, pp. 431-41, 1938.
- (23) HARMAN, H. H. Extensions of factorial solutions.
Psychometrika, Vol. 3, pp. 75-84, 1938.
- (24) HOLZINGER, K. J., and HARMAN, H. H. Relationship between factors obtained from certain analyses.
J. Educ. Psych., Vol. XXVIII, pp. 321-45, 1937.

- (25) HOLZINGER, K. J., and HARMAN, H. H. Comparison of two factorial analyses.
Psychometrika, Vol. 3, pp. 45-60, 1938.
- (26) HORST, P. A method of factor analysis by means of which all co-ordinates of the factor matrix are given simultaneously.
Psychometrika, Vol. 2, pp. 225-36, 1937.
- (27) HOUSEHOLDER, A. S. Conditioning circuits.
Psychometrika, Vol. 3, pp. 273-90, 1938.
- (28) HOUSEHOLDER, A. S., and AMELOTTI, E. Some aspects of Rashevsky's theory of delayed reflexes.
Psychometrika, Vol. 2, pp. 255-62, 1937.
- (29) HOUSEHOLDER, A. S., and Young, G. Matrix approximation and latent roots.
American Math. Monthly, Vol. XLV, pp. 165-72, 1938.
- (30) HUTCHINSON, J. B., and PUGH, B. M. A note on the importance of differences between examiners in the estimation of the ability of students.
Annals of Eugenics, Vol. VIII, pp. 107-16, 1938.
- (31) LANDAHL, H. D. Centroid orthogonal transformations.
Psychometrika, Vol. 3, pp. 219-25, 1938.
- (32) LANDAHL, H. D. A contribution to the mathematical biophysics of psychophysical discrimination.
Psychometrika, Vol. 3, pp. 107-25, 1938.
- (33) LANDAHL, H. D. Contribution to the mathematical biophysics of error elimination.
Psychometrika, Vol. 3, pp. 169-80, 1938.
- (34) LANGIER, H., and WEINBERG, D. Sur l'analyse de la variance du total des notes de l'examen écrit du baccalauréat.
Comptes Rendus, t. 207, pp. 22-4, 1938.
- (35) LEDERMANN, W. On the rank of the reduced correlational matrix in multiple factor analysis.
Psychometrika, Vol. 2, pp. 85-94, 1937.
- (36) LEDERMANN, W. A shortened method of estimation of mental factors by regression.
Nature, Vol. 141, p. 650, 1938.
- (37) LEDERMANN, W. The orthogonal transformation of a factorial matrix into itself.
Psychometrika, Vol. 3, pp. 181-8, 1938.
- (38) LEDERMANN, W. Note on Professor Godfrey H. Thompson's article "The influence of univariate selection on factorial analysis of ability."
Brit. J. Psych., Vol. XXIX, pp. 69-73, 1938.

- (39) LEV, J. Evaluation of test items by the method of analysis of variance.
J. Educ. Psych., Vol. XXIX, pp. 623-30, 1938.
- (40) KIMBALL, B. F. Comparison of scores of two populations under equalisation of scores of second attribute.
J. Educ. Psych., Vol. XXVIII, pp. 135-43, 1937.
- (41) KUDER, G. F., and RICHARDSON, M. W. The theory of the estimation of test reliability.
Psychometrika, Vol. 2, pp. 151-60, 1937.
- (42) KURTZ, A. K. The simultaneous prediction of any number of criteria by the use of a unique set of weights.
Psychometrika, Vol. 2, pp. 95-102, 1937.
- (43) MERRIL, W. W. Sampling theory in item analysis.
Psychometrika, Vol. 2, pp. 215-25, 1937.
- (44) McLOY, C. H., METHENY, E., and KNOTH, V. A comparison of the Thurstone method of multiple factors with the Hotelling method of principal components.
Psychometrika, Vol. 3, pp. 61-9, 1938.
- (45) MOSIER, C. J. A note on Dwyer: The determination of the factor loadings of a given test.
Psychometrika, Vol. 3, pp. 297-9, 1938.
- (46) MYERS, C. S., and others. A discussion of the application of quantitative methods to certain problems in psychology.
Proc. Roy. Soc., B., Vol. 125, pp. 415-34, 1938.
- (47) OLDS, E. G. A moment generating function which is useful in solving certain matching problems.
Bull. Amer. Math. Soc., Vol. 44, pp. 407-14, 1938.
- (48) REMMERS, H. H., and WHISLER, L. Test reliability as a function of computation.
J. Educ. Psych., Vol. XXIX, pp. 81-92, 1938.
- (49) RICHARDSON, M. W., and ADKINS, D. C. A rapid method of selecting test items.
J. Educ. Psych., Vol. XXIX, pp. 547-52, 1938.
- (50) ROTHNEY, J. W. M. Interests of public Secondary School boys.
J. Educ. Psych., Vol. XXVIII, pp. 561-94, 1937.
- (51) SAFFIR, M. A. A comparative study of scales constructed by three psychological methods.
Psychometrika, Vol. 2, pp. 179-98, 1937.
- (52) SPEARMAN, C. Abilities as sums of factors or as their products.
J. Educ. Psych., Vol. XXVIII, pp. 629-31, 1937.
- (53) THOMSON, G. H. Selection and mental factors.
Nature, Vol. 140, p. 934, 1937.
- (54) THOMSON, G. H. Methods of estimating mental factors.
Nature, Vol. 141, p. 246, 1938.

- (55) THOMSON, G. H. The influence of univariate selection on the factorial analysis of ability.
Brit. J. Psych., Vol. XXVIII, pp. 451-9, 1938.
- (56) THOMSON, G. H. Maximising the specific factors in the analysis of ability.
Brit. J. Educ. Psych., Vol. VIII, pp. 255-64, 1938.
- (57) THOMSON, G. H. The estimation of specific bi-factors.
J. Educ. Psych., Vol. XXIX, pp. 355-62, 1938.
- (58) THURSTONE, L. L. A new rotational method in factor analysis.
Psychometrika, Vol. 43, pp. 199-218, 1938.
- (59) TRAVERS, R. M. W. The elimination of the influence of repetition on the score of a psychological test.
Annals of Eugenics, Vol. VIII, pp. 303-18, 1938.
- (60) WILEY, L. E., and WILEY, A. M. Studies in the learning function. II. Critical values of the learning curve.
Psychometrika, Vol. 2, pp. 107-20, 1937.
- (61) WOODROW, H. The scaling of practice data.
Psychometrika, Vol. 2, pp. 237-48, 1937.

E. OTHER BIOLOGICAL APPLICATIONS

- (1) BARKWORTH, H., and IRWIN, J. O. Distribution of coliform organisms in milk and the accuracy of the presumptive coliform test.
J. Hyg., Vol. 38, pp. 448-57, 1938.
- (2) BERKSON, J. B. Some difficulties of interpretation encountered in the application of the Chi-Square Test.
J. Amer. Stat. Ass., Vol. 33, pp. 526-36, 1938.
- (3) CROZIER, W. J., and HOLWAY, A. H. On the law for minimal discrimination of intensities. III.
Proc. Nat. Acad. Sci., Vol. 24, pp. 130-5, 1938.
- (4) DUFRENOY, J. Conception statistique de la liberté en biologie.
J. Société Stat. Paris, 78^e Année, pp. 260-88, 1937.
- (5) GORDON, R. D. Note on estimating bacterial populations by the dilution method.
Proc. Nat. Acad. Sci., Vol. 24, pp. 212-15, 1938.
- (6) HUWS JONES, R. Physical indices and clinical assessments of the nutrition of school children.
J. Roy. Stat. Soc., Vol. CI, pp. 1-52, 1938.
- (7) MAXWELL, L. R. The mechanism of delayed killing of maize seeds with X-radiation.
Proc. Nat. Acad. Sci., Vol. 24, pp. 377-84, 1938.
- (8) MILES, A. A., MISRA, S. S., and IRWIN, J. O. The estimation of the bactericidal power of blood.
J. Hyg., Vol. 38, pp. 732-49, 1938.

- (9) NATH-DATTA, B., and MAHALANOBIS, P. C. A note on the foot and stature correlation of certain Bengal castes and tribes.
Sankhyā, Vol. 3, pp. 245-8, 1938.
- (10) PRIGGE, R. Fehlerrechnung bei biologischen Messungen.
Naturwissenschaften, B.25, 169-70, 1937.
- (11) RAIFORD, T. E. The measurement of variations in asymmetrical data with applications to haemoglobin statistics of infants.
Human Biology, Vol. 10, pp. 136-44, 1938.
- (12) RAIFORD, T. E. The relationship between height and weight of male and female infants between the ages of two weeks and one year.
Human Biology, Vol. 10, pp. 409-16, 1938.
- (13) SASTRY, N. S. R., and NAIR, A. K. Normal weight of newborn infants in Madras.
Sankhyā, Vol. 4, pp. 167-70, 1938.
- (14) SCHAEFER, W. Fehlerrechnung bei biologischen Messungen.
Naturwissenschaften B.25, pp. 218-19, 1937.
- (15) THOMPSON, W. R. Biological applications of normal range and associated significance tests in ignorance of original distribution forms.
Annals Math. Statistics, Vol. IX, pp. 281-7, 1938.
- (16) WAKE SIMPSON, T. Experimental methods and human nutrition.
J. Roy. Stat. Soc. Suppl., Vol. V, pp. 46-69, 1938.
- (17) YATES, F. The gain in efficiency resulting from the use of balanced designs.
J. Roy. Stat. Soc. Suppl., Vol. V, pp. 70-4, 1938.

F. ECONOMIC AND INDUSTRIAL

- (1) ANDERSON, O. N. On the question of the construction of an internationally comparable index of industrial production.
Publ. Stat. Inst. Econ. Res. State Univ. Sofia, 1937.
- (2) BERNARDELLI, H. The end of the marginal utility theory.
Economica, Vol. 5, pp. 192-212, 1938.
- (3) BRESCIANI-TURRONI, C. On Pareto's Law.
J. Roy. Stat. Soc., Vol. C, pp. 421-32, 1937.
- (4) BROSTER, E. J. A simple method of deriving demand curves.
J. Roy. Stat. Soc., Vol. C, pp. 625-41, 1937.
- (5) BOWLEY, A. L. Note on Professor Frisch's "The Problem of Index Numbers."
Econometrika, Vol. VI, pp. 83-5, 1938.

- (6) CONNOR, L. R. Charts illustrating the "Trade Cycle."
Trans. Manchester Stat. Soc., Session 1937-38.
- (7) COWLES, A., and JONES, H. E. Some a posteriori probabilities
in stock market action.
Econometrika, Vol. V, pp. 280-94, 1937.
- (8) DANIELS, H. E. Some problems of statistical interest in
Wool-Research.
J. Roy. Stat. Soc. Suppl., Vol. V, pp. 89-128, 1938.
- (9) DAVIS, H. T. Mathematical adventures in Social Science.
American Math. Monthly, Vol. XLV, pp. 93-105, 1938.
- (10) DEMARIA, G. Correlazioni economiche nel tempo.
Rend. Semin. mat. fis. Milano, Vol. 10, pp. 255-77, 1936.
- (11) DIRKS, F. C. Retail sales and labour income.
Rev. Econ. Stat., Vol. XX, pp. 128-34, 1938.
- (12) DODD, E. L. Index numbers and regression coefficients as
means, internal and external.
*Rep. Third Ann. Res. Conf. Econ. Stat. Colorado Springs,
U.S.A.*, 1937, pp. 13-16, 1937.
- (13) FRICKEY, E. The theory of index-number bias.
Rev. Econ. Stat., Vol. XIX, pp. 161-73, 1937.
- (14) FRIEDMAN, M. Mr. Broster on Demand Curves.
J. Roy. Stat. Soc., Vol. CI, pp. 450-4, 1938.
- (15) FRISCH, R. On the inversion of moving averages.
Skandinavisk Actuarietidskrift, 1938, pp. 218-25.
- (16) FRISCH, R. The double expenditure method.
Econometrica, Vol. VI, pp. 85-90, 1938.
- (17) GLASS, D. V. Fertility and economic status in London.
Eugenics Review, Vol. XXX, pp. 117-24, 1938.
- (18) HAGSTROEM, K. G. Pure economics as a stochastic theory.
Econometrica, Vol. VI, pp. 40-8, 1938.
- (19) HILFER, I. Differential effect in the butter market.
Econometrica, Vol. VI, pp. 270-84, 1938.
- (20) HOTELLING, H. The general welfare in relation to problems
of taxation and of railway and utility rates.
Econometrica, Vol. VI, pp. 242-70, 1938.
- (21) JONES, H. E. The nature of regression functions in the cor-
relation analysis of time series.
Econometrica, Vol. V, pp. 305-25, 1937.
- (22) KALECKI, M. The principle of increasing risk.
Economica, Vol. 4, pp. 440-7, 1937.
- (23) LANGE, O. The rate of interest and the optimum propensity
to consume.
Economica, Vol. 5, pp. 12-32, 1938.

- (24) LEONTIEF, W. W. Interrelation of prices, output, savings and investment.
Rev. Econ. Stat., Vol. XIX, pp. 109-32, 1937.
- (25) LEWIS, E. E. Intercommodity relationship in stable demand.
Econometrica, Vol. VI, pp. 130-42, 1938.
- (26) MASON, E. S. Price inflexibility.
Rev. Econ. Stat., Vol. XX, pp. 53-64, 1938.
- (27) MCINTYRE, F. The problem of the stock price index number.
J. Amer. Stat. Ass., Vol. 33, pp. 557-63, 1937.
- (28) MENDERHAUSEN, H. Annual survey of statistical technique methods of computing and eliminating changing seasonal fluctuations.
Econometrica, Vol. V, pp. 234-62, 1937.
- (29) MENDERHAUSEN, H. An example of meaningful curvilinear regression in economic time series.
Econometrica, Vol. V, pp. 329-41, 1937.
- (30) SAMUELSON, T. A. A note on the pure theory of consumers' behaviour.
Economica, Vol. 5, pp. 61-71, 1938.
- (31) STAEBLE, H. Short-period variations in the distribution of incomes.
Rev. Econ. Stat., Vol. XIX, pp. 133-43, 1937.
- (32) STAEBLE, H. New considerations on the distribution of incomes and the "propensity to consume."
Rev. Econ. Stat., Vol. XX, pp. 134-41, 1938.
- (33) TINTNER, G. Maximization of utility over time.
Econometrica, Vol. VI, pp. 154-8, 1938.
- (34) WOLD, H. On the inversion of moving averages.
Skandinavisk Actuarietidskrift, 1938, pp. 208-17.
- (35) ULLMO, J. Recherches sur l'équilibre économique.
Annales de l'Institut Henri Poincaré, Vol. VIII, pp. 1-62, 1938.

G. COMPUTATIONAL

- (1) AITKEN, A. C. Studies in practical mathematics. III. The application of quadratic extrapolation to the evaluation of derivatives and to inverse interpolation.
Proc. Roy. Soc. Edinb., Vol. LVIII, pp. 161-75, 1938.
- (2) BATEN, W. D. A formula for reducing the computations necessary to find the variance of a set of averages.
J. Agric. Res., Vol. 55, pp. 575-80, 1937.
- (3) COMRIE, L. J., HEY, G. B., and HUDSON, H. G. Application of Hollerith equipment to an agricultural investigation.
J. Roy. Stat. Soc. Suppl., Vol. IV, pp. 210-24, 1937.

- (4) DWYER, P. S., and MEACHAM, A. D. The preparation of correlation tables on a tabulator equipped with digit selection.
J. Amer. Stat. Ass., Vol. 32, pp. 654-62, 1937.
- (5) DWYER, P. S. The simultaneous computation of groups of regression equations and associated multiple regression coefficients.
Annals Math. Statistics, Vol. VIII, pp. 224-32, 1937.
- (6) DWYER, P. S. The computation of moments with the use of cumulative totals.
Annals Math. Statistics, Vol. IX, pp. 288-304, 1938.
- (7) EDGERTON, H. A., and STARBUCK, E. O. A table to aid in the computation of Fisher's "t" function for comparison of two means.
Psychometrika, Vol. 2, pp. 77-84, 1937.
- (8) FRUCHT, R. Sul metodo d'interpolazione del Franck.
Giorn. Ist. Ital. Attuari, Vol. VIII, pp. 338-40, 1937.
- (9) GHISELLI, E. E., and KUZNETS, G. Short-cut methods for calculating raw and corrected correlations between a composite variable and its components.
J. Educ. Psych., Vol. XXVIII, pp. 237-40, 1937.
- (10) HEY, G. B. A new method of experimental sampling illustrated on certain non-normal populations.
Biometrika, Vol. XXX, pp. 68-79, 1938.
- (11) LIDSTONE, G. J. Notes on Interpolation. I. The derivation of the general dividend-difference formula. II. Aitken's new process for direct and inverse interpolation. III. Special devices.
J. Inst. Actuaries, Vol. LXVIII, pp. 267-96, 1937.
- (12) LIDSTONE, G. J. Accuracy of arithmetical approximation.
Trans. Faculty Actuaries, Vol. XVII, Part II, pp. 27-37, 1938.
- (13) KUDER, G. F. Nomograph for point biserial r , biserial r , and fourfold correlations.
Psychometrika, Vol. 2, pp. 135-8, 1937.
- (14) MOSAK, J. L. On the simultaneous determination of the elementary regressions and their standard errors in subsets of variables.
J. Amer. Stat. Ass., Vol. 32, pp. 517-25, 1937.
- (15) PEARL, R. On the moment product-sums of frequency distributions.
Human Biology, Vol. 9, pp. 410-16, 1937.
- (16) SELWYN, E. W. H. Note on the use of probability paper.
Proc. Phys. Soc., Vol. 50, pp. 914-18, 1938.

- (17) SAWKINS, D. T. The use of cumulative graphs for estimation of means, higher moments, etc.
Metron, Vol. XIII Part 3- pp. 33-48, 1938.
- (18) STEVENS, W. L. Integration and interpolation.
Annals of Eugenics, Vol. VIII, pp. 387-402, 1938.
- (19) SWAROOP, S. Tables of the exact values of probabilities for testing the significance of differences between proportions based on pairs of small samples.
Proc. of the 1st Session of the Indian Statistical Conference, Calcutta, 1938, pp. 73-84, and *Sankhyā*, Vol. 4, pp. 73-84, 1938.
- (20) TUCKER, L. R. A method for finding the inverse of a matrix.
Psychometrika, Vol. 3, pp. 189-97, 1938.

H. MISCELLANEOUS

- (1) ALLEN, H. S. Time and Probability.
Nature, Vol. 142, p. 354, 1938.
- (2) BARNES, C. On the statistical determination of the masses and parallaxes of binary stars.
Monthly Not. Roy. Astr. Soc., Vol. 97, pp. 454-8, 1937.
- (3) BOSE, S. S., and MAHALANOBIS, P. C. On the exact test of association between the occurrence of thunderstorm and abnormal ionisation.
Sankhyā, Vol. 3, pp. 249-51, 1938.
- (4) FISHER, R. A. On the statistical treatment of the relation between sea-level characteristics and high-altitude acclimatizations.
Proc. Roy. Soc., B., Vol. 126, pp. 25-9, 1938.
- (5) FORTET, R. Résolution d'un système d'équations de M. Schroedinger.
Comptes Rendus, t. 206, pp. 721-3, 1938.
- (6) GROSSMANN, K. H. Theoretische Betrachtungen zum Geschiebetrieb.
Schweizer Bauzeitung, B.110, pp. 170-3, 1937.
- (7) HALDANE, J. B. S. Mathematics of air-raid protection.
Nature, Vol. 142, pp. 791-2, 1938.
- (8) JEFFREYS, H. On statistically steady distributions in Astronomy.
Monthly Nat. Roy. Astr. Soc., Vol. 97, pp. 59-64, 1937.
- (9) KENDALL, M. G., and BABINGTON SMITH, B. Randomness and random sampling numbers.
J. Roy. Stat. Soc., Vol. CI, pp. 147-66, 1938.

- (10) KOSTEN, L. Über Sperrungswahrscheinlichkeiten bei Staf-
felschaltungen.
Elektr. Nachr.-Techn., B.14, pp. 5-12, 1937.
- (11) ROWLAND, E. N. The theory of the shot effect. II.
Proc. Camb. Phil. Soc., Vol. 33, pp. 344-58, 1937.
- (12) SANDERS, S. B. Consistency of recording data from prison
files.
J. Amer. Stat. Ass., Vol. 32, pp. 323-36, 1937.
- (13) YULE, G. U. A test of Tippett's random sampling numbers.
J. Roy. Stat. Soc., Vol. CI, pp. 167-72, 1938.

A NOTE ON MIGRATION AND VERHULST'S LOGISTIC CURVE

By HELMUT MÜHSAM.

THE logistic law of population growth was noted for the first time by Verhulst, and at a later date was independently brought into prominence by Pearl and Reed for the special purpose of representing the growth of *human* population. However, the fact that this law may be applied to a large number of growth phenomena occurring in different branches of animal biology became the central point of the whole theory. There is therefore some reason to suppose that only certain trends in the natural movement of population account for the concordance between the logistic curve and the observed population growth, and to consider migration as a disturbance of the natural development. Pearl writes * in this regard :

“ The effect which might have been supposed to appear of ‘ waves of immigration ’ is most conspicuous by its absence. The reason is that the sole effect of *net* immigration (that is, number of immigrants less number of emigrants) has been somewhat to steepen the general upward slope of the United States curve, without either altering its fundamental shape or putting irregular waves in its course. It is the normal, natural increase — the steady excess of births over deaths—which fundamentally determines the form of the population growth curve.”

It is rather difficult to separate the respective effects of natural increase and increase by migration on the growth of the population of the United States, owing to the lack of complete statistical data of births and deaths at earlier dates. The task of the present study is therefore to examine the shape of the growth curve of a population which increases mainly by immigration. The Jewish population of Palestine may very well serve as an example of such a population, Palestine having received, in proportion to its population, the largest number of immigrants ever recorded.

During the period for which reliable statistical records are available (1922–38) the Jewish population of Palestine increased by 316,000 individuals, the net immigration amounting to 248,000 persons. Thus, nearly 80 per cent. of the total increase may be ascribed to immigration. Unfortunately, only two censuses have been taken, one in November 1922, the other in December 1931. It is evident that the data of two such censuses do not give conclusive evidence

* Pearl, R., *The Biology of Population Growth* (London, 1926), p. 13.

on the general shape of the growth curve. Moreover, the greatest influx of immigrants began after the second census, and lasted until 1936. The present study must therefore be based on the figures estimated by the Office of Statistics of the Government of Palestine. The estimates relating to the first period, immediately after the establishment of the Mandatory Government, were probably erroneous, but they could later be corrected by the result of the 1931 census. For the period after that census they may be regarded as a very close approximation to reality.* The figures of the population originate in the data of the census, and are further based on the number of births and deaths, furnished by the Department of Health, and on the balance of migrations, calculated by the Department of Migrations. The principal source of error is the illegal immigration. But in this study all corrections of the official statistical data are excluded, and the figures of the *de facto* Jewish population are used, as they are given in the *Statistical Abstract of Palestine* (1937-8, page 20.—The figure of 1938 is taken in the *Monthly Bulletin of Current Statistics*, January 1939) for the middle of each year from 1922 until 1938. During this time two immigration waves occurred, the first reaching its peak in 1925, the second in 1935. Each of these waves gives occasion to a complete "logistic cycle" of population growth. The equations of the logistics are

$$y_{\text{until 1927}} = \frac{72,000}{1 + 0.0680 \cdot e^{-1.37x}} + 83,000$$

and

$$y_{\text{from 1927}} = \frac{273,000}{1 + 217 \cdot e^{-0.726x}} + 149,000.$$

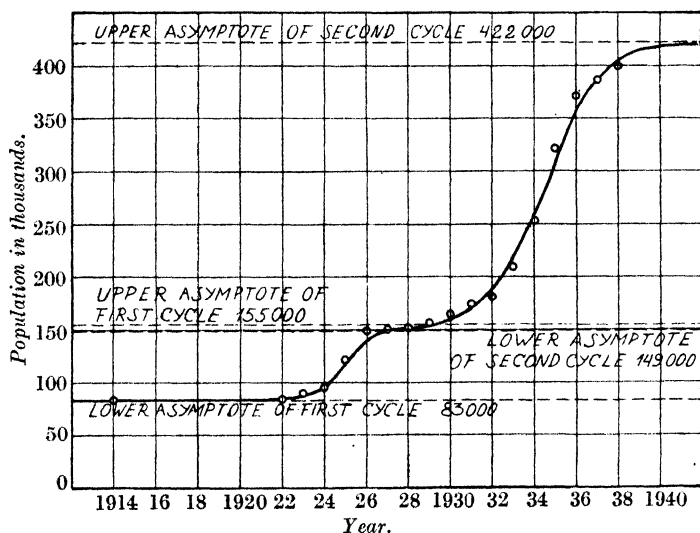
The table and the figure show the degree of accuracy with which the logistic curves describe the growth of the Jewish population. The fit of the first cycle is rather poor: six points are to be fitted by a function with four constants, one of them (1926) clearly cannot be included in the curve. This discrepancy may be explained by a more detailed examination of the migratory movement of 1926. The figure of the population on 30th of June of that year is, indeed, higher than the mean population of the whole year, owing to the fact that during the first six months a net immigration of 7,000 persons was registered, whilst for the second half a year there was a net emigration of 1,400. As a matter of fact, the wave of immigration of 1925 ceased more rapidly than could have been foreseen by the logistic law.

* For a discussion on this point, see Mühsam, *H. Bevölkerungsprobleme Palästinas, Metron* (in course of publication).

TABLE.

The Growth of the Jewish Population of Palestine.

First cycle.				Second cycle.			
Year.	Population		error in %.	Year.	Population		error in %.
	observed.	calculated.			observed.	calculated.	
Lower asymptote	83,000	83,000	—	Lower asymptote	149,000	149,000	—
1914	more than 80,000	83,000	—	1927	149,800	150,200	+0.3
	80,000			1928	151,700	151,600	-0.1
1922	83,800	84,100	+0.4	1929	156,500	154,300	-1.4
1923	89,700	87,200	-2.7	1930	164,800	159,700	-3.1
1924	94,900	96,900	+2.1	1931	172,000	170,200	-1.0
1925	121,700	118,200	-2.9	1932	180,800	189,300	+4.7
1926	149,500	139,800	-6.5	1933	209,200	221,100	+5.7
1927	149,800	150,500	+0.5	1934	253,700	265,200	+4.5
Upper asymptote	155,000	155,000	—	1935	320,400	314,200	-1.9
				1936	370,500	356,500	-3.8
				1937	386,100	385,800	-0.1
				1938	399,800	403,200	+0.9
				Upper asymptote	422,000	422,000	—

*The Growth of the Jewish Population of Palestine.*

The circles give the observed population figures, the smooth curve is the graph of the logistics.

As for the second immigration wave, the logistic curve fits the observed population growth in a more satisfactory manner. There is only one deviation exceeding the 5 per cent. mark. The mean

percentage error, regardless of sign, is, for the whole fit, 2.4 per cent.; the net percentage deviation having regard to sign is, in total, 4 per cent. Unfortunately, conclusions as to the future development of the Jewish population of Palestine cannot be drawn from this logistic analysis. The latter would suggest that the Jewish population of Palestine has only to increase by 22,000 souls before reaching its upper limit. Whereas, as a matter of fact, even should there be no immigration, this limit would be exceeded within three years, owing to the natural increase, which alone amounts to more than 7,000 a year. In reality, a new immigration wave, masking the effect of natural increase and giving rise to a new logistic cycle, must be awaited. It is a question of political decisions rather than demography as to when it will begin and what will be its dimensions.

A population growing by immigration thus follows Verhulst's logistic curve in the same manner as populations growing by natural increase. In their ultimate result, immigration and natural increase play analogous parts, and represent merely two parallel and complementary factors in the biological phenomenon of population growth.

One difference must, of course, be emphasized. Whilst logistic cycles of naturally increasing populations may extend over two or three centuries, the cycles observed in the growth of the Jewish population of Palestine follow each other at intervals not much greater than ten years. It has therefore been possible to encounter here an example of a population completing *two* complete logistic cycles, for which comprehensive statistical records are available; that is, so far as we know, the first case of such an examination having been made. What the rôle of these logistic cycles of short periods will be in a history of population growth extending over centuries must remain an unanswered question for the present.

REVIEWS OF STATISTICAL AND ECONOMIC BOOKS

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1.—*Karl Pearson, An Appreciation of some Aspects of his Life and Work.* By E. S. Pearson. Cambridge University Press, 1938. 10½" × 7½". viii + 170 pp. 10s. 6d.

This account of Karl Pearson's life and work does not pretend to discuss in detail all his many activities, but, having been originally written for publication in *Biometrika*, it deals rather more completely with those subjects which are of special interest to readers of that Journal. The author has, however, given a sufficient account of Karl Pearson's other work to make the book attractive to a wider range of readers. The early pages tell of Pearson's family and upbringing, his Cambridge career, his time at Heidelberg and Berlin and his life in London up to the time when he was appointed to succeed Clifford as Professor of Applied Mathematics at University College, London. It is the story of a clever, sensitive youth, kicking at times against tradition, making friends who remained friends for life, working and lecturing in various subjects—mathematical, social, ethical, etc. till he found his life's work. From 1884 to 1933 Pearson was a member of the professorial staff of University College, and letters are quoted showing the impression his teaching had on his pupils and paying a tribute to the conscientious way he treated them and their work. In an appendix the lecture courses on the theory of statistics given by Pearson at University College in 1894-6 and in 1921-2 are printed—the former is from notes by

Yule, who contributes some interesting remarks. A letter from Pearson is quoted (page 16) in which he says :

“ One of my proudest reminiscences was a sentence of Sir William Ramsay’s in a talk about a colleague’s disorders in class : ‘ You and I, you know, Pearson, are the only men who can hold big classes in complete silence in the College.’ I don’t know how he knew, but I don’t think I ever turned a man out of class . . . in thirty years. This is not a boast, because it was so practically from the first, and while I am always nervous and in doubt at a public lecture because I have to deal with a new topic and can’t foretell my audience, a subject you know well to a daily audience whom you know personally and can watch individually is a different thing. I think one is born to it, and that is why I say it is not a boast. . . .”

The quotation is interesting not only because it shows that Pearson felt he could always keep the interest of his classes, but because it brings out his feeling of nervousness at a public lecture which, though well known to his friends, would hardly have been guessed by his audience.

It was in 1890 that Weldon was appointed to the Jodrell Professorship of Zoology, and this led not only to an intimate friendship but to the direction of Pearson’s interests with increasing intensity into a new field, though, as the author says, “ the inspiration behind this development must be attributed to Francis Galton.” For in Pearson’s own words, “ It was Galton who first freed ‘ him ’ from the prejudice that sound mathematics could only be applied to natural phenomena under the category of causation. Here . . . was a possibility . . . of reaching knowledge— as valid as physical knowledge was then thought to be—in the field of living forms. . . .” Pearson’s Gresham Lectures included the Geometry of Statistics, and in 1892 he was discussing the Laws of Chance at those lectures : the syllabuses are reproduced in an Appendix and are of considerable interest. There followed the *Grammar of Science* and the early papers to the Royal Society, etc. The author deals satisfactorily with this early work in statistical mathematics and with the various methods Pearson evolved for measuring correlation and discusses sympathetically Pearson’s work on inheritance. In connection with what may be called the “ Mendelian misunderstandings ” the author points out that there is nothing inconsistent between Mendelism and Pearson’s work, and remarks that “ a myth regarding some essential error in the biometricians’ approach has persisted to this day ”. The present biography may help to get rid of this myth by its quiet explanation and its understanding of the Mendelians’ position.

Then the book goes on to deal with Pearson’s various activities, his appointment to be the first Galton Professor of Eugenics, his work during the War, and his subsequent work. Finally the author writes of Pearson’s retirement and the closing years.

Throughout the book letters from Pearson are quoted, and we are enabled to follow the family life and see something of him during his vacations in Oxfordshire, at Saig, and in the Yorkshire Dales. In this way we are reminded not only of work and of opinions but of the man himself.

The author has all through his book succeeded not only in giving a picture of Pearson but in showing a kindly understanding and a broadminded sympathy with those who criticized him. Pearson produced a vast amount of original and brilliant work, and he did far more for mathematical statistics than any of his contemporaries, but, naturally, changing circumstances and further knowledge have led to corrections and to modifications of his treatment, and his biographer has not been afraid to indicate them. It is a temptation, especially for a son writing of a father, to leave out "the warts and pimples," though to give way to that temptation turns his subject into something that is not human and into someone whom the reader cannot know.

In the preface the author says that the book is "in no sense a Life of Karl Pearson; to deal adequately with so large a subject would need far more time" than he could give. It may be true; but the book is a wonderful tribute, written with skill, knowledge, and sympathy. For me, at any rate, it brings to life again a man I admired, a friend I loved.

W. P. E.

2.- *Principles of the Mathematical Theory of Correlation.* By A. A. Tschuprow, translated by M. Kantorowitsch. Hodge and Co. 8½" × 5½"; x + 194 pp. 12s. 6d.

The German edition of this book was published in 1925,* shortly before the author's death, and one approaches this translation of nearly fifteen years later with some doubts whether it may not be rather out of date. Such doubts are groundless. Notwithstanding the advances of recent years, Professor Tschuprow's tract remains, within the limits which the author set himself, a notable contribution to the literature of correlation, and may still be read with profit.

The author's principal object in writing this book (which is based on lectures delivered at actuarial seminars) was to "clarify the fundamental notions and assumptions in the calculus of correlation." He therefore confined himself to the case of two variables, and omitted technical and mathematical details— even the normal correlation surface does not appear. The greater part of the book is concerned with such questions as the logic of correlation analysis, the connection between causal relation and correlation, and the nature of stochastic dependence. There are some useful chapters on the estimation of coefficients from empirical material; but Tschuprow was primarily aiming at an exposition of the "why" of correlation, not the "how" or the "where."

The difficulty about coefficients of correlation (a term which Tschuprow uses to include not merely product-moment correlation, but association and contingency) is to interpret them. On this aspect the book is incomplete. To a certain extent this was inevitable, for it was written before the appearance of some important papers on the subject such as Udny Yule's work on nonsense-correlations. But it is permissible to wonder whether the nature of correlation can be truly apprehended without a knowledge of partial correlations. In my experience the commonest fallacy in economic

* See *Journal*, 1926, p. 320.

statistics is of the *cum hoc ergo propter hoc* type, for the analysis and exposal of which partial correlations, or the ideas on which they are based, are essential. A further chapter on the logic of partial correlation analysis would add greatly to the value of the book.

The translation has been faithfully done; in fact, in places a little too faithfully for comfortable reading. Thirty or forty definite articles sprinkled through the book would improve such sentences as "In older literature we occasionally find the value of standard error of empirical correlation coefficient denoted by . . . etc." There are some unaccountable omissions of references appearing in the German edition, particularly on page 192 in regard to some of the fundamental papers on the distribution of the correlation coefficient in samples from an infinite normal universe. But these are venial faults compared with the omission of the subject-index – a form of crime in translation which appears to be on the increase and deserves the sternest penalties. M. G. K.

3.—*An Introduction to Modern Statistical Methods*. By Paul R. Rider. Chapman and Hall. $8\frac{1}{2}'' \times 5\frac{1}{2}''$. ix + 220 pp. 13s. 6d.

The object of this book is to give an account of the most widely used statistical methods which have been invented in the last twenty or thirty years. The author also claims that since the earlier chapters develop the fundamental concepts of statistics the book is suitable as a text-book for a first course in the subject.

Excluding the exercises at the end of each chapter, 7 pages are devoted to frequency distributions, 13 to averages and moments, 16 to regression, including multiple and curvilinear regression, and 15 to correlation. These four are presumably the ones which develop the fundamental concepts. Then follow chapters on the binomial and normal distributions, the *t*-distribution, χ^2 , the analysis of variance, and experimental design.

There is a tendency for books of this type, which frankly abandon any attempt to discuss the theoretical bases of the methods put forward, to degenerate into a series of recipes. Mr. Rider's book seems open to criticism on these lines. Nearly all the tests with which it deals are based on normality in the parent universe, but nowhere does the author give any indication how to decide whether an assumption of normality is legitimate in any given case. Nor does he discuss sampling, randomness, or probability. Even the term "standard error" is not defined or used. It would seem that Mr. Rider has over-compressed and over-simplified the book. M. G. K.

4.—*The Natural History of Population*. By Raymond Pearl. Johns Hopkins University; Oxford University Press, 1939. xii + 416 pp. 10s. 6d.

The Heath Clark Lectures, University of London, were delivered in 1937 by Professor Raymond Pearl, one of the Royal Statistical Society's distinguished Honorary Fellows, and the present book gives the material which the lectures summarized. Professor Pearl's position as one of the world's leading authorities on all sides

of the so-called "Population Problem" needs no stressing. He has personally been responsible for many and varied publications in this field, and the total volume of work which has emanated from people in his department at the Johns Hopkins University is probably only known to that department. In all his work there has been obviously a desire to get to the bottom of the particular subject. This *motif* runs all through the present book. He analyses the problem, showing what information is necessary before any judgment may be given, and then he presents the results of his researches and of his investigation into the work of others. An illustration of this will suffice. At the beginning of the book he is desirous of giving information relating to the age at menarche. He examines masses of literature on the subject and concludes "as a statistical generalization, the average age of menarche as judged by a world-wide sample of considerable size, is not far from 15 years." This average is well known to many of us, not from statistical investigation, but from vague statements culled from scientific or semi-scientific literature. But Pearl gives us the other elements, besides the average. We now know something of the variability of this statistic, what its lowest limit is and how it varies geographically.

Similarly, when he tackles the problem of measuring fertility, he takes into consideration all the various factors which are likely to be involved. He presents a chart (p. 96), showing the interplay of the various factors, economic circumstances, education, age, specific innate reproductive capacity, density of population, physical health, reproductive wastage rate, and so on. All this is necessary if we are to compare statistical results of one group with those of another.

He concludes (p. 164), after an exhaustive analysis which takes account of the various factors, that the proportion of women physiologically capable of reproduction who actually reproduced in 1930 was smaller for all the age groups of mothers, except the youngest, than it was in 1920. He asserts "that there was some reason to believe that this change probably could not be wholly attributed to an increase of contraceptive efforts in the population in the ten-year period."

Having argued the need for records of all the facts relative to human fertility, he gives an account of a mammoth investigation planned by him with the aid of funds from the Milbank Memorial Fund, where information relating to marital history was sought from patients in hospitals in a number of American cities. In the book he gives us considerable information about this important investigation, and makes us realize its magnitude and its scope. Ultimately, what was sought was the difference between the reproductive patterns of females who assert that they never practised contraception and those who assert that sometime during their reproductive period they have been contraceptors. He realizes fully the difficulties involved in grouping together all those persons who have practised contraception of various kinds in varying degrees, and he knows the inherent weaknesses of his facts. But the main conclusion showing the differences that exist between the various groups in his analysis

is enough to give some indication, at any rate in default of better information, of the effect of the recorded practice of contraception.

He concludes "that contraception, as actually practised in the population, is not having nearly so great an effect in lowering the reproductivity . . . as many would have us believe" (p. 160). He also concludes, from an analysis involving the data grouped in economic, educational, and religious classes, that "if it were not for the effect of contraceptive efforts and the practice of criminal abortion, together with correlated habits as to postponement of marriage, there would apparently be little or no significant differential fertility as between economic, educational and religious classes of urban American married couples." In other words, the differences are due to differences in contraceptive efforts and not to biological differences.

The first part of the book is concerned with many biological facts relating to populations, especially to fertility, the middle of the book is devoted to a discussion of the large investigation on contraceptive habits already referred to, and the last chapter is on the subject of world population. Here, in comparatively few pages, he presents a picture of the growth of population through the ages and shows its distribution by area and by "empires". Some of his opinions in this chapter are necessarily person. He refers to the growth and decay of former empires. He seems to think that man accepts calmly the prospect of the inevitable decline of the present civilization.

There is obviously some difficulty involved in the presentation of the results of scientific work of this sort, especially when it brings in statistics. Prof. Pearl has a simplicity of expression which rides through the use of long words and scientific expression. At times, also, the man who obviously delights in paradox and has a strong sense of humour breaks through, and gives us, on p. 185, in reference to a statistical table, "A reasonable way of putting the matter is that while more highly educated girls may or may not be more moral than their educationally less fortunate sisters, at least they know better, on the average, how to forefend the dire consequences of such excursions as they may choose to make into the realm of amatory dalliance."

The book will occupy a prominent position in the literature devoted to the scientific study of population problems. E. C. R.

5.—*Aperçu de la Démographie des Divers Pays du Monde 1929-1936*. The Hague: Office Permanent de l'Institut International de Statistique, 1939. 10½" × 7¼". 433 pp. Fl. 8.

All students who have occasion to use vital and census statistics will be glad that a new volume of the *Aperçu Démographique* has at long last appeared. The new volume is, moreover, a considerable improvement on the 1929 issue. It contains detailed bibliographic references and a much wider range of tables than earlier volumes. Thus, for example, there are not only expectations of life, but also life-table mortality coefficients and survivor tables. Life-table

fertility and death-rates are included, as well as tables of unmarried survivors—mortality excluded—at quinquennial ages. The present reviewer is also particularly glad to note the inclusion of a table of net reproduction rates, though he would prefer to see more descriptive detail given in subsequent issues of the volume. Thus, for example, not all the net reproduction rates cited are calculated by the same method, and it would be useful to note the different methods. It would also be useful to mention the particular life-table adopted as the basis of calculation of each rate. But there is no doubt that the volume is an indispensable compendium of basic demographic data.

D. V. G.

6.—*Das Bevölkerungsproblem in Frankreich*. By H. von Posadowsky-Wehner. (Beiheft zum Archiv für Bevölkerungswissenschaft und Bevölkerungspolitik.) Leipzig: S. Hirzel, 1939. x + 134 pp. 7 Rm.

This book, primarily the result of a year spent in France in 1935-36, gives an interesting survey of various aspects of the demographic position in France. Beginning with a brief account of the growth of the French population, the author proceeds to an analysis of some of the factors responsible for the very small rate of growth, including an account of changes in mortality and nuptiality, and of the fall in fertility. The third section discusses the results, in the political and economic spheres, of the low rate of growth of the population, special attention being drawn to the international balance of power and the influence of demographic stagnation upon the development of pacifist and "collective security" attitudes in France. The final section discusses the various measures which are being applied in France at the present time to stimulate fertility, and includes a survey of changes in the law relating to naturalization, as affected by the desire to maintain the size of the population. There is little analysis of the results of the various measures, though the author concludes that they have not been able to check the fall in fertility. He believes that only rigorous measures could have this effect, but, since such a policy would currently and apparently profit only a small section of the community, he does not think it likely that the necessary measures will be adopted in a parliamentary system. However, the fact that in the past France has made sudden political changes, makes him believe it possible that in the future the required kind of authoritarian State may be obtained. But political changes are not in themselves sufficient to reverse the trend in fertility. What is needed, says the author, is the elimination of the prevailing *Lebensideologie*, with its desire for security of life, its belief in the absolute equality and freedom of the individual, and its anxiety to rise in the world. The author believes that such a change will be extremely difficult for France to achieve, as the current view of life is not a new phenomenon, but is now deeply rooted in the minds of the people.

D. V. G.

7.—*Studies in Income and Wealth*. By the Conference on Research in National Income and Wealth. New York: National Bureau of Economic Research. (London: Macmillan.) 2 vols. $9\frac{1}{4}'' \times 6''$. Vol. 1, 1937. 10s. 6d. Vol. 2, 1938. 14s.

Six American Universities co-operated with the National Bureau of Economic and Social Research to form a "Conference on Research in National Income and Wealth." These two volumes of studies contain the first reports submitted at meetings from December 1936 to April 1938 and discussion thereon. The field covered is controversial and the effort has been to stimulate discussion rather than to make authoritative and final statements.

M. A. Copeland looks upon concepts of wealth and income as essentially accounting concepts. National income estimates may be obtained by consolidating either all the income statements of entrepreneurs or all the income and expenditure statements of individuals. Most attention is given to the statements of entrepreneurs with a healthy tendency to accept published figures for practical reasons. Certain accounting practices may be agreed as undesirable, yet "corrections are so fraught with difficulty and so likely to prove arbitrary that there is a strong presumption against making them." Entrepreneurial income statements are divided into 19 items and combinations of these discussed as possible measures of income. The basic national income concept, called net social income, is receipts from sale of products, plus subsidies, plus current valuation of the physical increment in assets, minus purchases from other entrepreneurs, taxes, and depreciation. Alternatively, it is payments to employees, including insurance, plus net interest, dividends, and gifts paid out, plus additions to reserve. If a firm during a year sells for £150 an asset valued at £100 at the beginning of the year, the additional £50 is not income, though an alternative definition might make it so. For banks and other financial institutions interest is a most important receipt, and net interest paid out is likely to be such a large negative item that the contribution of the institution to national income is negative. This corrects for the whole national income an over-estimate of the contribution of entrepreneurs who have borrowed from these institutions.

A paper on the measurement of national wealth by Simon Kuznets is well described by E. M. Martin, who says that a substantial portion is devoted "to proving that national wealth estimates have no use that cannot be better served by national income figures." Kuznets seems to seek something more objective than the theoretically correct valuation of items of wealth which is "the value of services they are expected to yield in the future, discounted at the appropriate rate of interest." He asks whether "it is justifiable to hinge the wealth estimate upon such an elusive and highly variable basis as what people think the given items of wealth will yield in the future." But, equally, current market price cannot be evaluated because only an infinitesimal number of transactions take place at the point of time at which wealth is measured, an objection which Dr. Kuznets assures us is not mental hair splitting. National income is obtained over a period of time and almost the whole of the goods measured

pass through the market in that time. In such a case valuation is relatively simple, but how does one value at the end of 1922 a coal mine last sold in 1917? In discussion Gerhard Colm points out that it is easier to value durable consumption goods such as jewels and furniture than to value the income derived from their use; it is easier to obtain the cost of public properties such as roads and warships than to value the services they render. R. J. Bye pleads for estimates of national wealth as indicating what future income is likely to be; measures of national income are only records of history.

The other papers are of a more specialist character, and various aspects of government activity take an important place. Gerhard Colm defines national income as that part of social product which is measurable, but as the demarcation between exchange and other sectors of the economy varies from period to period and from country to country an attempt must be made to make non-exchange items measurable. Much of the paper is concerned with the problem of government activity and its inclusion in such a way as to preserve the equality between the sum of individual incomes and the total value of goods and services handed over to consumers plus investments. The solution offered is to reckon individual incomes and undistributed profits after subtraction of direct taxation and to add government expenditure on finished products and on services rendered directly to consumers. If all government expenditure were either on finished products or on services rendered directly to consumers this method would be equivalent to adding to the sum of individual incomes and undistributed profits (without subtraction of direct taxes) the amount of indirect taxes paid. Practically, an example of the calculation is given for the United States. G. C. Means, considering problems in estimating national income arising from production by government, wishes government production to be valued primarily at cost. In this paper a view is expressed that there is justification in assuming that indirect taxes paid by companies are equal to the value of goods and services received by them from the government.

M. A. Copeland and E. M. Martin, discussing the correction of wealth and income estimates for price changes, are impressed by the fact that curious results are obtainable from a price index if half the "weights" are negative.

If we have :

Commodity	First year		Second year	
	<i>P</i>	<i>Q</i>	<i>p</i>	<i>q</i>
i.	2	3	1	3
ii.	1	- 2	2	- 1
$\frac{\sum pQ}{\sum PQ} =$	- $\frac{1}{4}$		$\frac{\sum pq}{\sum pQ} =$	- 1

In the second year, as the price index has become negative people are presumably paid to take away the whole production, which is as large a negative production as it was a positive production in the first year. Yet without the use of index numbers production is seen to be greater in the second than in the first year, and it sold for a positive amount.

A certain ethical value is claimed for estimates of national wealth and income corrected for price changes, for these will show no increase arising simply because new monopolistic positions have been created. But a monopolist may increase his wealth and income at the expense of other members of the community. This can be allowed for by deflation of the whole wealth (or income) and distributing this deflated value amongst persons in the proportions shown by current values; this is the "wealth-extant-total-distributed-on-current valuations."

Simon Kuznets deals with that part of business capital which is revalued each accounting period. There are two corrections which might be made to balance-sheet valuations. One, probably the minor one, is the correction for the inconsistency by which firms value stock at cost or current value, whichever is lower. The other correction involves valuation at the beginning and end of the year in terms of constant prices. It is largely a question of whether gains and losses from changing prices of stocks should be included as income. Kuznets says no. Solomon Fabricant on the treatment of corporate savings also discusses accounting practices in the light of what one is attempting to measure as national income. He deals especially with allowances for depreciation when replacement cost differs from original cost—an allowance which accountants do not make.

The paper by Gottfried v. Haberler is a contribution to the controversy as to the equality between savings and investments and it will be unfortunate if its inclusion in these studies leads to it being overlooked by students of that controversy. He is pessimistic about the utilization of measures of national income in confirming or refuting various theories of investment and saving.

Carl Shoup on income taxation discusses allowances which might be made from gross income to arrive at income for taxation purposes, including allowances for necessary food, clothing and shelter. Roy Blough and W. W. Hewitt, discussing capital gains, draw a distinction between capital and property, capital being the item itself, property its value. Thus there has been a property gain but no capital gain if prices rise. It is suggested that the accountant deals primarily with property and the economist with capital, a difference which may account for differences of stress.

A review does not permit of adequate treatment of the thought-provoking papers in the volumes, and discussion of certain papers has been omitted altogether. In the papers themselves all statements are carefully qualified and it may appear that at times the reviewer in his comments has presumptuously simplified the argument.

H. S. B.

8.—*The Significance and Basic Postulates of Economic Theory.* By T. W. Hutchison, M.A. Macmillan and Co., Ltd., 1938. 8½" × 5½". x + 192 pp. Price 8s. 6d. net.

Such an examination of the methods that may be expected to yield new and important truths in Economics as the author of this book offers to his readers is likely to find a sympathetic reception

from many Fellows of our Society. The determination of the logical consequences of accepted postulates is a procedure familiar enough in conception. It is, however, essential to recognize that if the postulates, or any of them, are not true, or are not believed to be true, conclusions based on them cannot be claimed as scientifically established. It becomes, therefore, of importance to assure ourselves that the postulates of the earlier economists, whether as true of their time as they believed them to be, or not, are true of our time, before we apply their deductions to our circumstances. This constant procedure of testing the validity of the fundamental assumptions of any science worthy of the name is familiar enough in the so-called natural sciences, and need not be treated as objectionable in Economic Science. Our author insists, and, it would appear, with justice, that, besides such constant testing of the applicability to other times of the accepted postulates of (say) the classical economists, we may reasonably look for the discovery of new regularities, at least provisionally acceptable, and that, without such discoveries, economics has reached its limits as an empirical science. Those of us—presumably the majority of our Fellows—who are interested in statistical research of one kind or other are unlikely to look askance at such a conclusion.

In discussing the controversies on the Trade Cycle question, a matter recently occupying the attention of our Society, and to which the larger part of his concluding chapter is devoted by the author, he suggests that agreement on terminology, statistical investigation of differences regarding empirical facts, and much caution in the use of the terms "cause" and "effect" might be profitable, citing words of Malthus on a much earlier controversy for which that careful thinker suggested a similar remedy.

A. W. F.

9.—*Economics: A General Textbook for Students.* By Frederic Benham. London: Pitman, 1938. $8\frac{1}{2}' \times 5\frac{3}{4}''$. xv + 488 pp. 7s. 6d.

For a long time there has been an obvious need of a really up-to-date introduction to Economics. Dr. Benham has now provided one, ostensibly written for student-beginners. Yet the work will appeal to a much wider circle, including every type of intelligent reader who seriously wishes to understand the basis of modern economic theory and practice. And it will appeal not only to young students, but also to older and even old students who, in these days of change, may feel the need for a refresher course.

The young student should be pleased to find such a clear and simple, yet not too simple, introduction to the science. The old student may be as pleased with what he does not find as with what he does. He will find no trace of what has been called "Crossword Economics," with its cabalistic language, its complete divorce from reality, and its sole justification—the obvious satisfaction it gives to its devotees. Nor will he find a trace of that euphuism which marks some modern economic writing. Instead he will find an almost Bunyan-like chasteness of style and a simple yet satisfying explanation of the really important changes and tendencies in

modern economic theory and practice. Here, collected for the first time in one cheap volume, is the essence of modern economic life and doctrine.

On the practical side, the author does not content himself with vague generalizations, but gives really detailed pictures of such institutions as the Stock Exchange, holding companies, and commodity markets, and deals at length with the growth of protective duties and quota systems, with exchange equalization funds and more complete methods of exchange control, and with recent changes in the London money market and in central bank policy. Over the grave of the gold standard Dr. Benham is moved to a chivalrous defence of that device which "did not work badly . . . but was badly worked."

He describes the new approaches to many old problems briefly and clearly, but some may wish a little more space had been devoted to the new Imperfect Competition route, with its marginal cost and revenue curves, to the theory of value. He explains the greater emphasis nowadays laid on the idea of choice between alternatives and of scales of preference, declaring that the concept of utility as something absolute and measurable has been definitely discarded, although he himself does not carry the purging process so far as some theorists would wish. A particularly lucid exposition of indifferent curves is segregated in an appendix.

One or two minor matters may perhaps be open to criticism. And one might wish that a little more space had been devoted to this point, a little more stress laid on that. But detailed criticism of a first-class textbook merely tends to be tedious. One can only congratulate the author on a really admirable piece of work, and the publisher on its notably reasonable price. C. O. G.

10.—*Accounting for Economic Management*. By D. S. Blacklock, M.A., C.A. Glasgow: Jackson, Son and Co. 1938. 9½" × 7½". 128 pp. 8s. 6d.

After a training in economics and financial and cost accounting, together with a measure of practical experience, the author has been led to advance his views on the science of measuring industrial management. His qualifications for doing so are evident from the book he has produced. At the outset he lays emphasis upon adequate definition of detail, so that classification of items may be properly undertaken, and he thus identifies himself with the statistician, the source of whose troubles is frequently the difficulty of original definition. From this point, given a scientific basis of classification, Mr. Blacklock proceeds steadily and logically to develop his thesis of industrial control by means of detailed accounting and record. An analysis in considerable detail is given of the industrial departments in a modern firm. Such diversity of departments and sections would be found only in works of a substantial size and practising a highly efficient system of organization, but it is easily possible to group together appropriate items of detail in order to apply the analysis to firms of modest proportions where functional specialization is necessarily limited in degree. With such

a plan of the organization, each department and section is briefly discussed in the light of its own responsibilities and also according to its relationship with other units of the enterprise.

The discussion of schedule charts illustrates the care with which Mr. Blacklock approaches his work. He demonstrates in diagram form a system whereby each separate job has its life history recorded and analysed so that the executive may see at a glance which jobs were behind time and which were in front, as well as where and why time was lost or saved. The principle of the charts is more readily comprehensible than first impressions would suggest and reveal an ingenuity that should overcome any difficulty in absorbing new ideas.

Much of the material given in the introduction to the chapter on differential costing will be familiar to most students of the theory of index numbers, and the author fully acknowledges his indebtedness to Irving Fisher in this respect. The application of formulæ to actual data is shown in an explanatory table. Full consideration is given to the problems arising from subsidiary products jointly supplied with the main item of production and to the treatment of "scrap" material. The possibilities of the "job-card" with its associated forms and lists are indicated, after which the differential analysis of oncost and the analysis of profit variation are discussed. The final chapter, entitled "Some Economic Opinions," although excellent in itself, hardly seems to belong to a treatise on cost analysis.

There is no doubt that the views and methods propounded are the result of experience and thought. The author is not guilty of unnecessary explanation and has succeeded in his endeavour to secure a maximum of argument in a minimum of words. The book, however, is intended for the specialist, who will be well repaid for the close attention it requires.

R. F. G.

11. *Consumers' Co-operation in Great Britain*: an examination of the British Co-operative Movement. By A. M. Carr-Saunders, P. Sargant Florence, and Robert Peers. London: Allen and Unwin, Ltd., 1938. $8\frac{3}{4}'' \times 5\frac{3}{4}''$. 556 pp. 15s.

Co-operation at Home and Abroad: a Description and Analysis. Volume II, 1908-1938. By C. R. Fay, M.A., D.Sc. London: King, 1938. $8\frac{1}{2}'' \times 5\frac{1}{2}''$. x + 540 pp. 18s.

It is not proposed to "review" these two books here, but only to indicate the nature of their contents. The authors of the first-named remark that since the publication of Beatrice Potter's pioneer work in 1891 and the Webbs' book in 1922, "no comprehensive examination" of the "aims, methods, and results" of the co-operative movement has been undertaken. The volume which they sponsor was undertaken with the cordial assistance of the Wholesale Societies and the Co-operative Union, the necessary investigations being undertaken by a Committee consisting, besides the "authors," of Colin Clark, Margaret L. Cole, C. R. Fay, R. F. Harrod, John Hilton, J. Jewkes, H. A. Silverman, T. Searls, and Leonard Woolf, while a number of special studies were carried out by a group of students at the University of Birmingham. After a brief account of

the historical background of the movement its structure is elaborately analysed. The structure, government, and trading policy of the societies are critically examined and the financial organization of the various types of societies is described. Then follow, in order, the wholesale societies, co-operative insurance, other federal societies, productive societies, agricultural co-operative societies, the Co-operative Union, education, publications, and the Guilds. The third section of the book treats of the democratic control of the retail societies, the federal undertakings, and the National movement, and discusses various problems arising therefrom. "The problems of co-operative enterprise" under the headings of management, employment, efficiency of production and distribution, investment, relations to other forms of enterprise, and expansion occupy the fourth section, and the book ends with a consideration of the social aspects of co-operation and of its future.

Mr. Fay after thirty years resumes the theme which he took up in 1908 and finds that he is now regarding what has been historically "an expression of social democracy or at any rate of liberalism" still struggling for growth "in a time of economic and political uncertainty." The purpose of this volume is to show that the movement is a synthesis, which embraces industry as well as agriculture, consumer as well as producer. Naturally he covers much of the same ground as the first of the two books here noticed (in the construction of which, indeed, he collaborated), but the student may derive some advantage from comparing a more individual treatment with the results of team-work. After a "General" Part, he surveys industrial co-operation in Great Britain and Europe, and then describes agricultural co-operation in the English-speaking world. In the latter section there are some useful pages on the Agricultural Adjustment Administration of the "New Deal." Perhaps, in parts at least, the most novel section to British readers is Part IV, "Scandinavian Co-operation at Short Range." "This," says Dr. Fay, "I have singled out in order to focus attention on the intensity of its co-operation alike among industrial consumers and agricultural producers, and on the consequent effort which has been made in one of these countries, Sweden, to bring producers and consumers into measured agreement." Iceland, Norway, Sweden, Finland, and Denmark are covered here, and the book closes with a review of agricultural co-operation in Europe to-day.

These two books form an encyclopædia of co-operation. A movement which numbers 7,500,000 members in Great Britain and controls funds exceeding £300,000,000 is of the first importance. Whither is it tending, does it retain the old ideals, will it form the new structure of society? The authors of the first volume appear to think there is no clear uniform principle held to-day enthusiastically by the members and so there is a faltering in direction. It behoves all co-operators "to see to the state of the republic," and it is the duty of all, "reformers" and "conservatives" alike, to know what this great movement means and what can be made of it or what it can make of itself. In the books under notice lies the material for forming opinions and judgments.

H. W. M.

12.—*The People's Food*. By Sir William Crawford, K.B.E., and H. Broadley. London: Heinemann, 1938. $9\frac{1}{4}" \times 6\frac{1}{4}"$. xiii + 336 pp. 12s. 6d.

This is one of the most exhaustive enquiries that has so far been undertaken with regard to food. When, what, and how much people eat is a matter of vital interest, and the surprising fact is that so little real knowledge of the subject has been achieved. Sir William Crawford's book will retain for a long while a most important place in the literature of our national food habits.

As the distinguished chief of an advertising firm, he openly admits that the object of this survey was to provide a guide to those interested in the food industry, but in so doing he has provided material that will be used by all who investigate health and the national diet.

The work is the outcome of a sample enquiry covering almost 5000 households situated in seven large towns in Great Britain and undertaken during the six months ended March 1937. It is unfortunate that the adequacy of the sample is not statistically demonstrated, but the results given by the data collected suggest that it is not noticeably biased.

The returns were analysed in a variety of ways, but firstly in order to bring out the nature of the daily meals. This aspect is discussed in five chapters, beginning with breakfast. For each meal the food and drink consumed and the hour at which it is taken are shown according to each of the five social classes into which the sample population was classified. Thus it appears that the higher the social status the later is breakfast taken and the more fish, sausages, and coffee are consumed. The "morning break," the midday meal, tea and high tea, and the evening meal are similarly described. Some of the percentages given in these tables might have been grouped together with advantage, e.g. 0.2 per cent. of 422 families means one single instance, which hardly justifies a percentage on its own.

The second main group of results is given in the chapters devoted to specific foodstuffs. For each of the important foods and drinks the weekly expenditure and quantities purchased per head are shown in tabular and graphical form for each social class.

Other aspects of food are also considered, including the various ways in which the family's food is purchased and a chapter on cooking and the cookery books used. Of particular interest to the statistician is the discussion on food expenditure and income. The increasing proportion of income devoted to food as income falls is clearly demonstrated and in the lowest income classes the proportion rises to over 50 per cent. The discussion of these results in relation to the B.M.A. minimum diets and other estimates of food expenditure, as well as in the light of nutritional content and adequacy, indicates how very much remains to be done before a satisfactory diet is achieved for everyone in the population. It is found that, by applying the results of this enquiry to the population as a whole (which is done with admirable restraint and warning), over $7\frac{3}{4}$ million persons are living in homes where the food expenditure is below the bare minimum necessary for health.

The book concludes with some very constructive suggestions.

It is argued that to handle the food problems of the future a Food Research Institute is necessary. This proposal will be endorsed by the vast majority of persons interested in health, nutrition, and food.

Throughout the work a very attractive style is maintained and the many references to the diets and eating habits of generations past avoid the danger of a monotonous repetition of statistical fact. It is a book with a very wide appeal. R. F. G.

13.- *The Home Market*. By Major G. Harrison and F. C. Mitchell. 1939 Edition: Edited by M. A. Abrams, Ph.D. London: Allen and Unwin, 1939. 10½" + 7½". xvi + 152 pp. 12s. 6d.

For the purpose of this second edition the material contained in the first has been revised and enlarged. The book consists of a wide range of social and economic data relating to Great Britain, and in its 21 sections the manufacturer and distributor will find much to assist them in the intelligent disposal of the goods they have to sell. The opening sections are concerned with the age and sex composition of the population, its regional distribution, and future tendencies. Income grades, into which the 12 million families are classified, are determined by the income of the chief earner, which, however, is not necessarily an index of the family's purchasing power. The distribution of the national income and wealth is indicated, after which come an estimate of the national expenditure and the outgoings of sample families.

In most instances the statistics relate to 1937 or other very recent years, but occasionally (*e.g.* section 20) they are based on material over 10 years old, and purchasing habits, in terms of money spent, may have changed in the meanwhile.

This revised edition will be of considerable aid to those who seriously study the fundamental characteristics of the markets they serve. The critical statistician will appreciate how much information has been compressed into short compass, and although he may feel that some sections could profitably be enlarged, it must be remembered that elaborate statistical details, complete with explanations and footnotes, do not always commend themselves to non-statistical readers and that such refinement would therefore defeat the object of the book. The authors have taken pains to derive their material from the most reliable sources available, the references to which are freely given. R. F. G.

14.- *Economics of Peasant Farming*. By Doreen Warriner, Lecturer in Economic History at the School of Slavonic Studies, London. 1939. Oxford University Press. 8½" × 5½". 208 pp. 12s. 6d. net.

This work— the result of personal investigations by the author in 1935-7— deals with the conditions of peasant farming in Czechoslovakia, Hungary, Roumania, Bulgaria, Poland, and Yugoslavia. The field covered seems almost too wide, for although this vast area has many features in common it has also great diversities, and it is difficult to get a general view which is not qualified by too many exceptions. For the purpose of describing the farming systems,

however, the area is classified in regions and an interesting account, illustrated by photographs, is given of the contrasts between different districts and how they are affected by soil and climate, as well as by social and political conditions.

A distinguishing characteristic of peasant farming in these countries, and the one to which the author devotes much attention, is that of over-population in relation to the agricultural productivity of the soil. This applies in a degree to Czechoslovakia and Hungary, where the amount of land available for the farm population averages 4 acres per head, but chiefly to parts of Poland, Bulgaria, Roumania, and Yugoslavia where an appreciably higher and increasing density prevails. These densely populated districts, moreover, are not those with the richest soils or most favourable market conditions; it is, on the contrary, the mountain districts and the poorer soils which show the densest concentration and a resulting low standard of living. In this respect, these countries differ from Western Europe, where peasant agriculture is in a relatively favourable position. This over-population and difference in standards of living constitute the author suggests, a problem which lies at the root of Europe's economic difficulties. Two possible solutions are discussed economic control by Germany or collectivization on the Russian system.

As regards the first, what the peasant states need is not price-regulation, but rising prices: they need integration with the economic life of industrial Europe in the sense of access to markets with rising standards of living and cheap capital. How far closer connexions with Germany can offer these advantages is certainly doubtful. In any case, "since the extension of German control is likely to follow only as a result of successful power politics, it is desirable in the political interests of these countries to find a European solution in which the agrarian states will find a market for their produce while maintaining their independence."

An alternative solution is collectivization on the Russian model, and a valuable chapter is devoted to an analysis of the results so far obtained in the U.S.S.R. But the conclusion reached is that the Russian transformation of peasant agriculture into large-scale farms is not applicable to Eastern Europe, and that, in fact, these agrarian countries with their present farm density cannot evolve on their own resources a type of farm organization which can raise their standard of living appreciably. Overseas migration is suggested as the most desirable solution, though it does not seem a very practical one, but the author concludes that "without a redistribution of farm population to regions outside Europe, Europe's farm problem cannot be solved in a way which can be reconciled with economic progress and political stability."

Since the book was written Czechoslovakia has been absorbed into Germany, and the question of German penetration into Eastern Europe has become more acute. Much of the information has, therefore, a considerable topical interest.

R. J. T.

15.—Other New Publications.*

Hübners Weltstatistik: Geographisch-Statistische-Tabellen aller Länder der Erde. Neu bearbeitet von Dr. Ernst Roesner. Wien: L. W. Seidal u. Sohn, 1939. 12" × 9½".

[This is the 73rd issue of Otto Hübner's Tables. The first was published ninety years ago in duodecimo, and the later square octavo volume has this year been expanded into a large quarto and fundamentally revised. The place of publication has moved from Frankfort to Vienna, and the preface, dated from "Berlin und Wien," gives an indication of some of the re-arrangements of the statistical information to be found in the Tables. These are in five sections: Geographical; Areas and populations; Agriculture and industry; Communications; Finance, currency and trade. The Tables are preceded by political information (including in this edition the distribution of parties in the parliaments of 32 countries) and are followed by a bibliography of sources and an index of geographical names. An appendix to the population section gives, for the first time, tables showing the total number of Jews in the world and in the towns with the largest Jewish populations. The section on communications gives the latest figures for railways, road, water and air transport, detailed postal statistics, etc., and the following one gives for each country the figures of production, export and import of all commodities entering into trade. The volume is an encyclopædic summary of—in the words of the founders of the Society—"facts which can be stated numerically," and should be a valuable addition to any reference library.]

Innes (John). Class Fertility Trends in England and Wales, 1876-1934. Princeton: University Press, 1938. 8¾" × 5½". 152 pp. \$2.50.

[A painstaking investigation (the publisher's note calls it "an up-to-date hypothesis") of the course of the fertility rates of the social classes in this country, from the date of the downward turn of the birth-rate, which the author places in 1876-77. The study is based upon Dr. Stevenson's celebrated Report of the 1911 Census figures, and Dr. Heron's study of the class area rates for London boroughs published in 1906. In default of any data for the whole country later than those available to Dr. Stevenson, the author has followed Dr. Heron taking the London figures for the period 1909-33, but using a system of combined indices of economic status. His conclusion is that the differences in the area class rates have gradually narrowed until in 1931-33 "the pattern of relative decline had reached the point of but small fertility differences" between the first four of the five classes. The year 1934 was added to the original period of the enquiry in order to follow the trend after the upward turn of the trade cycle, and it was found that the London area-class rates of fertility decline "slackened, roughly, in direct proportion to status." Full details of the author's workings are given, with 31 tables and 14 graphs. The appendices give, respectively, a comparison of direct and indirect methods of standardization, and basic series in correlation analyses of fertility in class-area groupings in Metropolitan London. There is a full bibliography.]

Population Problems of New Estates, with special reference to Norris Green. University of Liverpool, Social Science Department: Liverpool University Press, 1939. 8½" × 5½". 51 pp. 1s.

[This brochure is No. 9 of the admirable *New Merseyside Series*, which embodies the results of enquiries undertaken in continuation and amplification of the *Merseyside Survey*. The Norris Green estate affords an

* See also "Additions to Library," p. 492.

example of the frustration of excellent intentions by a want of intelligent foresight. The Council built houses, but they built little else, so that work-places, shopping places and amenities were mostly miles away, and neither road-construction nor provision for transport kept pace with building. The uniformity of the sleeping accommodation, designed exclusively for couples with young families, resulted in an abnormal age-composition of the population which caused misfits in the accommodation of opposite kinds at different stages. All the facts are reviewed and the consequences demonstrated in words, figures, and particularly pleasing graphs. The author, Mr. Norman Williams, not only indicates the way to better planning but suggests methods for the improvement by adaptation of existing unsatisfactory arrangements. The report is an example of the practical value of a statistical exposition of carefully observed data.]

Rowntree (B. Seebohm). The Human Facts in Business; further experiments in Industrial Democracy. 3rd edition. London: Longmans. 7 $\frac{1}{4}$ " \times 4 $\frac{1}{2}$ ". xx + 244 pp. 4s. nett.

[In the original issue, published in 1921 (noticed in the Journal, 1922, p. 512), Mr. Rowntree described the way in which his firm "had tried to solve some of the human problems of business administration." In this edition he has brought the account up to date, and in doing so has practically re-written the book. In the first place, reforms introduced at the Cocoa Works, York, have now largely become commonplaces of factory practice. Secondly, the chief emphasis of the demands made by the human factor has shifted from questions of material benefit to those of status. The altered shape of the contents is shown in the sequence of the chapters, which in the first edition began with Wages, and Hours, and ended with Joint Control; in the present volume *The Workers' Status* is the first and longest chapter. The fact that at Messrs. Rowntree's the workers have a practically equal share in the decision of all matters affecting labour is the basis of the conditions described in the subsequent chapters on Wages, Economic Security, Hours of Work, and Amenities. The firm's labour policy has been framed in order "to raise the status of the workers of all ranks from that of servants to that of co-operators, . . . to introduce . . . in all matters directly affecting the workers as great a measure of democracy as possible without lowering efficiency." The last phrase is significant. One of Mr. Rowntree's main motives in publishing this experience was to provide material which would assist in answering the question whether it is possible under capitalism "to afford to the workers conditions as good as they might reasonably expect under any other industrial system." To recommend his book to those interested is superfluous.]

STATISTICAL NOTES

(1) BRITISH OFFICIAL STATISTICS

On page 470 we give our usual table summarizing the oversea trade of the United Kingdom for the years ended May 1938 and 1939. In the first quarter of this year the excess of imports over exports was £23·5 million less than a year earlier; the next two months showed but little change, the reduction in the adverse balance amounting to £23·3 million at the end of May. Exports of United Kingdom goods have throughout this year been approximately the same in value as in the corresponding month of 1938, and for the five months the change in value was only £171,000. Retained imports accordingly accounted for the whole of the reduction, but this was due in the main, if not entirely, to the lower level of prices this year. For the first quarter the calculations of the Board of Trade show a fall of 8 per cent. in average values of retained imports, whereas the reduction in the value of retained imports in the first five months of the year was under 7 per cent. For United Kingdom exports average values in the first quarter were 4 per cent. lower than a year earlier, and it is evident, therefore, that the volume of exports this year has been appreciably higher than it was in 1938.

Total imports during January–May 1939 were valued at £366,186,000, or £27,269,000 less than a year earlier, there having been a fall in value up to April and a rise in May. While the latter is accounted for by the extra working day in that month this year, the period of a substantial reduction in the value of imports is clearly at an end, and it was in fact due to a considerable extent to the excess quantities of iron and steel goods and of scrap imported in the first quarter of 1938, when reduced duties were in force. Another main cause of the decline in value of imports, and this is still continuing, is the very heavy fall in price of cereals; this accounts for one-third of the total fall in the value of imports for the five months. Re-exports amounted to £23,816,000, or £4,116,000 less than last year. About three-quarters of the decline was due to smaller re-exports of non-ferrous metals to the Soviet Union. There was also a considerable fall in re-exports of wool.

The value of retained imports of food, drink and tobacco during the first five months of the year amounted to £158,744,000, being £8,946,000 less than a year earlier. The decline in value, which, as

indicated above, is primarily in respect of grain and flour, has now been continuous for eight months. For grain and flour the decrease amounted to £8,688,000. Most of this was in respect of wheat, but the quantity of wheat imported and retained rose from 37·0 to 45·2 million cwts. For meat little change was recorded in either quantity or value. Dairy produce showed a considerable decline in value, mainly due to somewhat smaller imports of butter. Retained imports of tea fell by nearly £1½ million, due to the smaller quantity imported, while imports of sugar rose by over that amount, there being a corresponding increase in quantity. Though there was a decline of £2 million in respect of tobacco, imports being much less in quantity than the abnormally high figure for last year, the quantity retained for home consumption has reached a new high figure; for May, however, a decline in home consumption was recorded, doubtless as a result of the substantial increase in duty announced in the Budget.

Retained imports of raw materials fell by £13,107,000 to £86,723,000, but the period of decline seems to have ceased as a substantial increase was recorded for May. One of the principal causes of the decline was the return to a more normal importation of iron and steel scrap, already mentioned; another has been the hold-up of American cotton pending a decision as to the price at which the stock held by the United States Government would be sold. Considerable imports of cotton were, however, recorded in May, and while this may be attributed to a somewhat higher level of activity in the cotton industry, the conclusion of the recent agreement for an exchange of American cotton for tin and rubber, each to serve as reserves of essential commodities, may be expected to lead to considerably larger imports in the near future. As regards wool, retained imports have continued to be substantially greater than last year, and flax, hemp and jute also show a considerable expansion. Retained imports of rubber have fallen in value by £3 million, and in quantity by two-thirds, partly as a result of some recovery in re-exports.

The decline from £95,634,000 to £93,821,000 in the value of retained imports of manufactured goods was more than accounted for by the fall of £3,762,000 in respect of iron and steel. Resulting from a striking decline in re-exports, retained imports of non-ferrous metals rose in value by £1·2 million. A somewhat larger increase was recorded for chemicals, drugs, etc., and owing to a fall in the price of refined petroleum retained imports were £1·3 million less in value than last year.

Movements and Classes	Twelve Months ended May 1938	Twelve Months ended May 1939	Increase (+) or Decrease (—)
Imports, c.i.f.—	£'000	£'000	£'000
Food, drink and tobacco	439,757	422,357	(—) 17,400
Raw materials and articles mainly un- manufactured	304,817	233,933	(—) 70,884
Articles wholly or mainly manufac- tured	274,546	228,501	(—) 46,045
Other articles	6,915	8,377	(+) 1,462
Total Imports ...	1,026,035	893,168	(—) 132,867
Exports, f.o.b.—			
<i>United Kingdom Produce and Manufactures—</i>			
Food, drink and tobacco	37,344	36,505	(—) 839
Raw materials and articles mainly un- manufactured	61,532	56,914	(—) 4,618
Articles wholly or mainly manufac- tured	399,025	364,265	(—) 34,760
Other articles	12,939	13,370	(+) 431
<i>Imported Merchandise—</i>			
Food, drink and tobacco	13,396	12,232	(—) 1,164
Raw materials and articles mainly un- manufactured	31,410	29,693	(—) 1,717
Articles wholly or mainly manufac- tured	24,201	14,818	(—) 9,383
Other articles	648	749	(+) 101
Total Exports ...	580,495	528,546	(—) 51,949
Bullion and Specie—			
Imports	293,400	258,588	(—) 34,812
Exports	165,697	580,944	(+) 415,247

Movements of Shipping in the Foreign Trade—	Number of Vessels	Thousand Tons Net	Number of Vessels	Thousand Tons Net	Number of Vessels	Thousand Tons Net
<i>Entered with cargoes—</i>						
British	24,996	39,443	24,154	38,816	(—) 842	(—) 627
Foreign	28,226	31,209	25,606	28,698	(—) 2,620	(—) 2,511
Total entered ...	53,222	70,652	49,760	67,514	(—) 3,462	(—) 3,138
<i>Cleared with cargoes—</i>						
British	30,601	35,626	29,520	34,779	(—) 1,081	(—) 847
Foreign	22,716	24,667	21,956	25,104	(—) 760	(+) 437
Total cleared ...	53,317	60,293	51,476	59,883	(—) 1,841	(—) 410

Exports of United Kingdom goods during January to May amounted to £196,477,000, a total slightly in excess of that for 1938. For food, drink and tobacco there was an increase of £594,000, of which over half resulted from the higher average value of the spirits exported. The change in the aggregate value of exports of raw materials was negligible; the largest change in the individual groups (£400,000) resulted from a great increase in exports of staple fibre to the United States. There was also some recovery in exports of wool, but the value was substantially unchanged. The quantity of coal exported rose by 203,000 tons ($1\frac{1}{2}$ per cent.) as a result of larger shipments in May. The increases to individual countries were fairly widespread and were substantial, since there were two heavy declines, 809,000 tons in exports to France and 478,000 tons to Spain. Exports of manufactured goods fell by £1,107,000 to £153,636,000, but this decline was offset in part by a rise of £663,000 in exports by parcel post. The decline was primarily in respect of iron and steel (£4 million), cotton goods (£1½ million) and machinery (£1 million). Owing to larger exports of war vessels there was a rise of £3 million in the vehicles group. A substantial increase in exports of arms and ammunition accounted for a rise of £1 million in exports of miscellaneous manufactures, while purchases of tin by the United States, which a year ago were negligible, exceeded £1·1 million in the first five months of this year.

Exports of iron and steel have been much smaller this year than last, the decline amounting to 122,000 tons (14 per cent.), though for May there was a slight increase. The principal reductions continued to be in respect of tinned plates and railway material, but for galvanized sheets and wrought tubes increases were recorded. Exports of machinery fell by 19,700 tons, of which textile machinery accounted for 11,100 tons. There was, on the other hand, a marked increase in exports of machine tools. In the vehicles group exports of aircraft rose to a new high record, while rather smaller exports of motors and chassis were recorded, though for new private cars alone exports were maintained.

The decline in exports of cotton piece-goods amounted to 19 million square yards (3 per cent.), there being a further decline of 26 million square yards in exports to India and Burma, but some recovery in exports to British West Africa; for May an increase of 10 million square yards was recorded. Exports of woollen and worsted tissues were maintained, and larger purchases by the United States led to an appreciable recovery in exports of linen and jute piece-goods. Exports of the less finished goods—cotton yarns, wool tops and woollen and worsted yarns—were all considerably greater than last year.

Exports of bullion and specie in May (£95·5 million) were the highest ever recorded. In the five months exports amounted to £302·9 million and imports to £118·6 million, the excess of £184·3 million in exports this year comparing with an import excess of £64·1 million in the corresponding period of 1938.

The Stationery Office has lately published for the Board of Trade Part II of the *Final Report on the Fifth Census of Production and the Import Duties Act Enquiry*, covering the Iron and Steel Trades, the Engineering, Shipbuilding, and Vehicles, and the Non-Ferrous Metals Trades. As usual, this stout octavo volume of xviii + 553 pages (price 8s.) contains a wealth of information regarding the production of 1935, to which are added comparative particulars for 1924, 1930, 1933, and 1934. Taking the Iron and Steel Trades as a whole, the Net Output has increased from £98,600,000 in 1924 to £116,500,000 in 1935, the number of persons employed from 498,900 to 539,300, and the Net Output per head from £198 to £216; in 1930 the last figure was £186. Notwithstanding this aggregate increase, Net Output declined in the Blast Furnace, Tinplate, Wire, and Small Arms trades between 1924 and 1935, and the production index fell for the same trades, except Wire. In every case except for Tinplates and Tools the Net Output per head was greater in 1935 than in 1924. In 1930 firms employing 62·9 per cent. of the average number of the operatives and producing 62·5 per cent. of the Net Output paid in wages £37,330,000 (or 65 per cent. of the Net Output), or about £132·7 a year per head; in 1935 firms employing 64·5 per cent. of the operatives and producing 63·2 per cent. of the Net Output paid in wages £40,534,000 (or 55·1 per cent. of the Net Output) or about £129·0 per head per annum. This group of trades is on the whole characterized by large establishments, establishments with less than 100 persons employed producing only 17 per cent. of the Net Output, those with 100-499 employees 38·8 per cent., and those with 500 or more 44·2 per cent.; yet in both the Hardware and Tools trades the group of establishments with fewer than 100 employees was responsible for over a third of the Net Output.

The second group of industries shows the same general course as the first between 1924 and 1935, an increase in Net Output from £198,400,000 to £249,300,000, in persons employed from 985,600 to 1,104,400, and in Net Output per head from £201 to £226. Exceptions are the Shipbuilding trade and the Carriage, Cart, and Wagon Trade where the total Net Output fell by a third and a half respectively, but as the number of persons employed in the former fell by 42 per cent. the Net Output per head actually increased. The Aircraft industry trebled its number of employees, but the

Net Output rose only by 175 per cent. and the Net Output per head fell from £262 to £241. In Mechanical Engineering the number of employees fell from 448,200 to 432,800 and the aggregate Net Output increased by 14 per cent., while in Electrical Engineering the employees rose from 150,900 to 247,900 and Net Output by 75 per cent.; Net Output per head rose from £192 to £226 in the former branch and from £219 to £231 in the latter. In the Motor and Cycle Trade both Net Output and number of employees rose by nearly a half, but there was a small fall in the Net Output per head. Firms making returns of wages represented in number of operatives and in Net Output nearly two-thirds of the total group in 1930 and about three-quarters in 1935, and the average annual wage per head rose from £133 to £136·8. Over the whole group firms employing fewer than 100 operatives produced 14·3 per cent. of the Net Output, those with 100-499 operatives 24·5 per cent. and those with 500 or more 61·2 per cent. Between 1930 and 1935 the consumption of electricity in this group rose by about 37 per cent., whereas in the Iron and Steel group it increased by about one-half.

The Non-Ferrous Metals group is much smaller than either of the other two, the aggregate Net Output being slightly under £30,000,000 in 1935, having risen by 18·5 per cent. since 1924. The average number of persons employed rose in the period by about 6 per cent., so that the Net Output per head rose from £220 to £245. Net Output per head fell off in the Gold and Silver Refining, Plate and Jewellery, and Watch and Clock trades, and those trades engaged over a quarter of the total number employed. The firms engaged in the smelting and other treatment of Aluminium, Lead, Tin, etc., showed an increase from £292 to £359 in the Net Output per head, while in the smelting and rolling of Copper and Brass there was an increase from £231 to £250, and the Finished Brass Trades registered a rise from £178 to £194. In all trades except Plate and Jewellery the production index was much higher in 1935 than in 1924. The average amount of wages per head annually paid by the firms making returns (about a half of the group in 1930 and about two-thirds in 1935) fell from £129·8 to £122·4. This group is dominated by the small and moderate establishments, only 30·2 per cent. of the Net Output being produced in establishments with 500 operatives or more, while 28·5 per cent. was produced in 1935 by firms with fewer than 100 operatives.

The Board of Trade Journal for June 1st, 1939, contains as a Supplement the Preliminary Report, No. 1, of the Import Duties Act Enquiry, 1937, covering the Iron and Steel Trades (Blast Furnaces, Smelting and Rolling, Tinplates, Wrought Iron and Steel

Tubes, Needles, Pins, and Small Wares, and Small Arms). Comparative figures are given for 1935 and 1937, showing, *inter alia*, that, taking these trades together, net output rose from £51,934,000 in 1935 to £78,347,000 in 1937, the average number of persons employed from 215,322 to 261,351, and net output per head from £241.2 to £299.8. Considering the chief products, the output of pig iron and ferro-alloys rose from 6,488,600 tons to 8,371,000 tons; steel ingots and direct castings from 9,654,500 tons to 12,582,200 tons; steel bars and shapes from 4,555,800 tons to 6,007,300 tons; plates over $\frac{1}{8}$ in. from 1,073,900 tons to 1,584,400 tons; black plates under $\frac{1}{8}$ in. from 765,800 tons to 949,400 tons; tinplates from 602,800 tons to 814,400 tons; and tubes from 669,700 tons to 801,500 tons. The Needle, Pin, and Smallwares Trades produced a net output of £2,367,000 in 1937 and private firms in the Small Arms trade a net output of £458,000.

General *wholesale prices*, which had been falling more or less steadily since the last quarter of 1938 showed some resilience in April 1939, and the Board of Trade index number, which stood at 98.3 in December 1938 and at 96.6 in March 1939, advanced during April to 97.2 (Average for 1930 = 100). The change was almost entirely due to the increases in the duties on sugar and tobacco, prices of most other foods showing some decline and prices of industrial materials on balance showing little change. Mutton prices, however, advanced appreciably over the two months March and April 1939, and coffee prices strengthened considerably, being about 25 to 30 per cent. in excess of those ruling in December 1938. As regards industrial materials, there was an increase in the price of tin and some stiffening in the prices of artificial silk. Prices of raw jute continued to advance and in April 1939 showed an increase of over 40 per cent. on the prices in December 1938.

Compared with April 1938 general prices showed a fall of nearly 6 per cent., those of food and tobacco being 8.9 per cent. and those of industrial materials 4.1 per cent. below the prices at that date. The most noticeable decline was in the price of cereals, the group index number for which indicated a fall of as much as 25 per cent. between April 1938 and April 1939. As regards industrial materials, the only groups showing advances in the index number were those for non-ferrous metals and for textiles other than cotton and wool. These advances were almost entirely due to increased prices for tin (31 per cent.) and jute (53 per cent.). Paper-making materials continued to fall almost uninterruptedly during the last twelve months, and at April 1939 were still from 25 to 30 per cent. below the level of April 1938.

The Board of Trade index numbers of wholesale prices for the latest three months (February to April 1939) are given below :—

(Averages for the year 1930 = 100)

Date	Total Food	Total not Food	All Articles	Basic Materials	Intermediate Products	Manufactured Articles	Building Materials
Feb. 1939	91.1	99.7	96.8	89.9	98.8	108.4	102.1
Mar. „	90.1	100.0	96.6	90.2	99.4	108.6	102.2
April „	91.4	100.1	97.2	90.4	99.6	108.6	102.4
<i>April 1938</i>	<i>100.3</i>	<i>104.4</i>	<i>103.1</i>	<i>93.8</i>	<i>105.2</i>	<i>112.7</i>	<i>104.5</i>
„ 1937	102.0	112.5	109.0	132.2	107.5	108.4	103.5
„ 1936	87.3	94.3	91.9	97.3	91.1	96.6	95.0

April 1937 marked the highest point reached by the index number of prices for basic materials, and it will be seen that prices are even now over 30 per cent. below those for that date.

The figures of certain other British index numbers of wholesale prices and the official index numbers of wholesale prices in France, Germany and the United States are given below for comparison :—

Date	Board of Trade (1930 = 100)	<i>Economist</i> (1927 = 100)	<i>Statist</i> (1866-77 = 100)	<i>The Times</i> (1913 = 100)	France (Stat. Generale) (1929 = 100)	Germany (Stat. Reichsanst.) (1929 = 100)	U.S.A. (Bureau of Labor) (1926 = 100) *
Feb. 1939	96.8	68.5	88.6	110.3†	109.3	77.6	76.6
Mar. „	96.6	69.1	89.0	110.6	108.9	77.7	76.7
April „	97.2	69.2	90.5	111.1	107.7	77.6	76.0
<i>April 1938</i>	<i>103.1</i>	<i>73.3</i>	<i>93.5</i>	<i>118.1</i>	<i>102.6</i>	<i>77.0</i>	<i>78.5</i>

* Mean of weekly prices. † Corrected figure.

There was a slight fall over the months March and April 1939 in the general level of *retail* food prices. Bacon, eggs, butter, cheese and milk all showed some decline, chiefly due to seasonal causes. On the other hand, there was some advance in the price of potatoes, and the prices of sugar rose in consequence of the increased duty. The Ministry of Labour's index number of retail prices of articles of working class consumption (prices at July 1914 = 100) stood at 153 on May 1st, 1939, being the same figure as for April 1st and March 1st, some slight changes in rent, etc., counterbalancing the

fall in food prices. For food prices alone the index number was 134 at May 1st, compared with 135 at April 1st and March 1st and 138 at January 1st, 1939. Compared with 12 months ago, the index number for all articles (food, clothing, rent, fuel, etc.) showed a decline of rather less than 2 per cent., principally owing to decreases in the prices of articles of food. The Ministry of Labour's index number for recent months is given below.

	Dec. 31st, 1938	Feb. 1st, 1939	Mar. 1st, 1939	April 1st, 1939	May 1st, 1939	April 30th, 1938
Food Prices	138	138	135	135	134	139
All Items (food, clothing, rent, fuel, etc.)	155	155	153	153	153	156
All Items (a year earlier)	159	157	156	154	156	152

The improvement in employment which usually takes place in March and April was appreciably accentuated this spring, and the reduction in the numbers registered as unemployed between the winter high-level of the count at January 16th, 1939, and those at April 17th amounted to 394,632, as compared with a reduction of 79,843 only over the corresponding period in 1938. The rate of unemployment in the insured trades in Great Britain and Northern Ireland had fallen to 11.4 per cent. at April 17th, 1939, compared with 14.1 per cent. at January 16th, 13.2 per cent. at February 13th and 12.1 per cent. at March 13th. At April 4th, 1938, the proportion unemployed was 12.4 per cent. The improvement in March and April took place in nearly all the principal industries, but in the woollen and linen industries there was little change. Compared with the position twelve months ago, there was a fairly general decline in unemployment, although work was not quite as plentiful in ship-building, in the pottery trades and at blast furnaces. Unemployment in April was lowest in the South-Western area (6.7 per cent.), London (7.8 per cent.), South-Eastern (7.5 per cent.) and in the Midlands (8.2 per cent.). It was highest in Northern Ireland (24.8 per cent.), and Wales (20.6 per cent.). In the Northern Area it was 17.4 per cent., North-Western 15.1 per cent., Scotland 14.8 per cent. and North-Eastern 11.5 per cent. For agriculture alone the rate in Northern Ireland was as high as 19.8 per cent. even at the middle of April 1939, a rate very difficult to account for, but it was as much as 27 per cent. at the middle of March. The percentages unemployed for the latest four months in the insured trades are given below :—

Date	Percentage Unemployed in Great Britain and Northern Ireland of Workpeople Insured under—				
	General Scheme	Agricultural Scheme	General and Agricultural Schemes		
			Males	Females	Total
Jan. 16th, 1939 ...	14·3	11·1	14·9	12·0	14·1
Feb. 13th, „ ...	13·4	9·8	13·9	11·4	13·2
Mar. 13th, „ ...	12·3	7·8	12·7	10·4	12·1
April 17th, „ ...	11·6	6·1	11·9	9·8	11·4
<i>April 4th, 1938 ...</i>	<i>12·7</i>	<i>5·7</i>	<i>12·6</i>	<i>11·6</i>	<i>12·4</i>

The total number of workpeople aged 14 to 64 (insured and uninsured) on the registers of the Employment Offices of the Ministry of Labour in Great Britain is given below for the same period. Of the total unemployed on April 17th, 1939, about 52,000 were boys and girls between 14 and 16 and 48,000 between 16 and 18. Considerable numbers of those at the earlier ages, though applicants for employment, are remaining whole time at school until employment is obtained.

Date	Wholly Unemployed	Temporarily Stopped	Persons nor- mally in Casual Employment	Total
Jan. 16th, 1939 ...	1,594,431	379,027	65,568	2,039,026
Feb. 13th, „ ...	1,538,512	291,680	66,526	1,896,718
Mar. 13th, „ ...	1,429,085	231,245	66,599	1,726,929
April 17th, „ ...	1,343,295	238,729	62,370	1,644,394
<i>April 4th, 1938 ...</i>	<i>1,321,061</i>	<i>358,278</i>	<i>68,425</i>	<i>1,747,764</i>

The Ministry of Agriculture has published its annual estimate of the *value of the agricultural output* for 1937-38. These estimates are based on the assumption that the agricultural land of England and Wales forms, as it were, one large farm, and they accordingly represent the value of the quantity of produce sold by farmers to the non-farming community. It is important, however, to remember that the result is not the "net output," as production at its present level is only made possible by the purchase by farmers of substantial quantities of feeding stuffs either imported ready for use or manufactured from home-grown or imported produce, and also by the purchase of imported store stock for fattening, imported seeds, fertilisers, etc. The figures for the past seven years are given below,

together with the additional sums received by farmers as a result of the wheat and cattle subsidies.

Millions of £

	1931-32	1932-33	1933-34	1934-35	1935-36	1936-37	1937-38
Livestock and live-stock products	126.3	128.3	135.9	138.2	141.4	148.6	154.4
Farm crops ...	33.0	26.4	30.4	35.9	36.0	39.8	35.3
Fruit and vegetables ...	20.7	20.0	25.0	23.8	20.0	23.7	25.0
Glasshouse produce	7.0	7.8	7.7	8.1	8.5	8.8	8.8
Total ...	187.0	182.5	199.0	206.0	205.9	220.9	223.5
Wheat and cattle subsidies ...	—	4.3	6.7	8.3	8.0	4.1	4.6
Total ...	187.0	186.8	205.7	214.3	213.9	225.0	228.1

It will be seen that there has been a substantial rise since the slump in 1931, the figures for 1937-38 being 22 per cent. above those for 1931-32. The total is now larger than for any year since 1924-25.

2. OTHER STATISTICS.

Stock Exchange Values continued to decline during March and April 1939, due to a great extent to the international political crisis. Some slight recovery had been apparent towards the end of February and the first part of March, but the German invasion of Czechoslovakia seriously affected prices on the London Stock Exchange, and indeed all stock markets. The index number of the *Bankers' Magazine* (values at December 1921 = 100), which stood at 111.7 at February 16th, 1939, had fallen to 107.1 by April 20th, a decrease of over 4 per cent., and was lower than at any time since April 1932. The index number for Fixed Interest Stocks had fallen 4.3 per cent. (115.8 to 110.8) and that for Variable Dividend Securities 3.1 per cent. (103.2 to 100.0), and values have generally continued to decline. The decline has been common to practically all classes of securities, although there was a slight increase in the price over the two months of British Railway Preference and Ordinary stocks, due, no doubt, to recent improved traffic returns, and shipping shares have shown some resistance to decline, possibly on account of the promise of a government subsidy. Over the same period copper shares fell in value about 20 per cent. and rubber shares about 10 per cent. British and Indian Funds fell between 4 and 5 per cent.

Over the three months February to April 1939 the total amount of *retail sales* showed an increase of 2.0 per cent. compared with the corresponding three months of 1938. Sales of articles of food and of perishables increased 2.2 per cent. and of other merchandise 1.6 per cent. The statistics are prepared by the Bank of England in conjunction with various associations of retail distributors and co-operative societies and the index numbers based on the average daily sales of 1937 were 91 for February, 96 for March and 108 for April 1939 compared with 89, 93, and 107 in the corresponding months of 1938. The only district showing a fall was Central and West End London, where sales declined 5.0 per cent. Increases were highest in Scotland and Midlands (3.4 per cent.), and lowest in Suburban London (1.3 per cent.).

There was a decline in *Shipping freights* in March 1939 and a somewhat small recovery in April. The index number prepared by the Chamber of Shipping of the United Kingdom, which stood at 121.5 in February 1939 (average of 1935 = 100), declined to 117.5 in March and rose to 119.5 in April. A good share of the rise in the latter month was due to the considerable increase in chartering grain from the Argentine for shipment to Spanish and other ports in Europe and also for the East. There was, however, some improvement in other directions as well as some not inconsiderable decline in other rates. Compared with April 1938 the index number showed a fall of 5.8 per cent.

In view of the serious situation in the world wheat market, the International Institute of Agriculture has issued a special study entitled *The World Wheat Situation in 1938-39*, which, after describing the causes of the crisis, sets out the essential features of the wheat problem and the conditions for its improvement. Very detailed statistical tables are given showing the history of wheat crops and markets during recent years.

Fundamentally, the trouble is due to the expansion in the world wheat area, which was begun during the War and has continued with few set-backs for 15 years from 1923 to 1938. Taking the 1923-27 average as a base, the wheat area in 1938 was 24 per cent. higher in the exporting countries (which account for about 77 per cent. of the total) and 70 per cent. higher in the importing countries. The total output obtained varies, of course, with the character of the seasons, but in 1938-39 the world production was 28.9 per cent. above the average. As a consequence the supplies available for export in the current year ending July 31st, 1939, are estimated at

1180 million bushels, while import requirements, even allowing for some building up of reserves, are only estimated at 570 million bushels. Thus the supplies in surplus-producing countries, after meeting the expected requirements of the year, will leave a balance sufficient to supply the entire import requirements of 1939-40. In other words, supplies are sufficient to cover import requirements not for one but for two years.

Various expedients are being adopted by the different countries to relieve their congested markets, but wheat consumption is by nature very inelastic, and is only slightly stimulated by a fall in price, so that an increase in sales above the real import requirements is apt to result in reduced purchases at a later date.

The Institute points out that a lasting market recovery can only be achieved by restoring the equilibrium between production and consumption—that is, by an adjustment of the output of exporting countries to the import capacity of importing countries. The only solution apparently is to restrict production by reducing the area sown, but the practical difficulties in the way of an international agreement which would have this effect are very great.

The noteworthy changes which have taken place in the *Russian wheat trade* are the subject of an article in the *Monthly Bulletin of Agricultural Economics* (May 1939) issued by the International Institute of Agriculture.

In pre-war days Russia was the largest exporter of wheat in the world, and sold on the average about one-fifth of her production. Under the new regime this position has been entirely altered: exports have been much reduced, while in recent years the output has increased, so that in 1933-37 the proportion sent out of the country was less than 2 per cent. of the total production. Annual averages for certain five-year periods are given below. The figures shown for the pre-war period refer only to the territories within the present boundaries of the U.S.S.R.

Thousands of quintals

	Output	Exports	Proportion of Exports to Output, Per cent.
1909-13	206,025	44,689	21.69
1923-27	184,200	4,500	2.40
1928-32	217,000	10,900	5.02
1933-37	328,220	6,100	1.85

The average crop in the five years 1933-37 was 50 per cent. higher than in the earlier periods shown, and the surplus (*i.e.* output

less exports), was double that of 1909-13. The International Wheat Advisory Committee estimated in 1938 that the annual average quantity of wheat used in Russia for human consumption increased from 119 million quintals in 1909-14 to 189 million quintals in 1932-37, a rise of nearly 60 per cent. The quantity available per head did not increase proportionately, as in the same period the population of Russia increased from 134 millions to 169.3 millions or by about $26\frac{1}{2}$ per cent. There were also great changes in distribution, the urban population having risen from 25 millions in 1913 to 60 millions in 1937, a change which in itself represents an increased demand for wheat. As regards the prospects of further expansion in output, much is being done to increase the yield per hectare, and wheat-growing is extending from the areas of surplus output towards the north and east, where its production is inadequate for local requirements.

CURRENT NOTES

FELLOWS will have been gratified to learn that the University of London have shown their appreciation of Mr. R. G. Hawtrey's long and distinguished services to economics by conferring on him the Honorary Degree of Doctor of Science (Economics).

Congratulations are also offered to Dr. Corrado Gini, an Honorary Fellow of this Society since 1920, on his election as an Honorary Member of the International Statistical Institute.

The hundredth Annual Meeting of the American Statistical Association was held in Detroit, December 27-30th, 1938. The *Bulletin* of the Association (Vol. I, No. 5) publishes a short account of the meeting, which included thirty-five sessions, at which there were 109 principal speakers, 39 from universities and colleges, 23 from the business world, 40 from government agencies, and seven from other organizations. Professor Raymond Pearl was elected President for 1939, and the first four pages of the eight-page *Bulletin* consist of an open letter from him to the members of the Association, recapitulating its development from the meetings of a few statistically-minded persons to an organization which is looked to by governmental and private bodies for trustworthy information and disinterested advice; he stated in plain terms that the problem confronting it—one not unfamiliar in similar associations—is to increase the income, which is at present “insufficient to maintain even the present scale of operations.” The organization, in 1935, of a Central Office, has, the President went on to say, brought “a broader and deeper understanding of the needs and opportunities for service.” Among the things which should be done but cannot now be done for lack of financial resources, he enumerated: the creation of a statistical profession suitably regulated; the institution of an efficient central clearing-house for “statistical personnel problems”; an adequate mechanism for coping with the stream of requests for statistical information. Whether these objects are necessarily appropriate to the scope and aims of a private organization is a question on which there may be differences of opinion, arising, no doubt, for the most part from differences in national temperament; but sympathy may none the less be felt in respect of the monetary problem confronting the Association.

The latest volume (No. XV) of the *Collected Papers from the Department of Biology of the Johns Hopkins University* contains, like the rest, a number of Professor Raymond Pearl's contributions to knowledge and exhortations to wisdom, the latter as stimulant as the former are illuminating. The volume opens with the address on "Progress in the Biological Sciences" given at the Centenary Celebrations of the University of Michigan (1937), in which he reviewed the advances made by the human species in the past hundred years - advances, as he says, of the animal side and not of the spirit—speculates on its destiny, and considers the part which universities should perform in the contrivance of a plan of salvation, with especial emphasis upon biological research. This is appropriately followed by his article on Biology, contributed to the *Encyclopedia Americana* (1938 edition). His third paper is "On the Product-Sums of Curtate Frequency Distribution," and the "General" section (*i.e.*, Part I) is completed by two studies in Population Physiology (*Tribolium Confusum*), by Thomas Park. Part II (Human Biology) contains five more papers by Pearl, three concerned with Longevity, one on the contributions to Vital Statistics of Dr. Billings; the last treats "Of Human Folly"; A. Ciocco contributes six, including "Variation in the Sex Ratio at Birth in the United States" and two papers on Human Social Biology, and participates in another dealing with evidence for the inheritance of rheumatism. The remaining contents are two papers on "Tuberculosis and Civilization," by Geo. Wolff, and six classified lists of Recent Literature Useful in the Study of Human Biology, reprinted from *Human Biology*, 1938.

The Proceedings of the fifth International Conference of Agricultural Economists, held at Macdonald College, Quebec, in August of last year, have been published by the Oxford University Press. This, the first meeting to be held in Canada, attracted the largest attendance on record; twenty-three countries were represented. In his opening address, the President, Mr. L. K. Elmhirst, spoke of the need for co-ordination in scientific research, and in particular of the futility, in these days, of segregating economic and social statistics of agricultural conditions, considerations which had led him to plan the programme of the Conference with a view to the special emphasis on the social aspects of agricultural and economic policy. Three of the main subjects discussed were, accordingly, the Social Implications of Economic Progress in Present-Day Agriculture; Land Tenure and the Social Control of the Use of Land; Farm Labour and Social Standards. The fourth discussion was on

International Trade in Relation to Agricultural Developments. The remainder of the programme consisted of shorter papers of an informative nature; the subjects included Agriculture in Argentina, New Zealand's Economic Policy, Agricultural Co-operation in Canada, the Mexican Agrarian Reform, and Recent Agricultural Experiments in Eire. The volume closes with the history and constitution of the International Conference and a list of the Members.

STATISTICAL AND ECONOMIC ARTICLES IN RECENT PERIODICALS

UNITED KINGDOM—

Agricultural Economics Society, Journal of Proceedings, June, 1939
—The consequences of the world depression on agriculture in the Netherlands: *B. Gerritzen*. Experiments in the marketing of agricultural products: *I. M. Sieff*. A retail butcher's business: *D. Witney*.

Annals of Eugenics, June, 1939—An example of the quasi-factorial design applied to a corn breeding experiment: *C. D. R. Dawson*. The comparison of samples with possibly unequal variances. *R. A. Fisher*. The distribution of the *M* and *N* factors in random samples of different races: *G. L. Taylor* and *A. M. Prior*. The recovery of inter-block information in variety trials arranged in three-dimensional lattices: *F. Yates*.

The Banker—

April, 1939—Can we avoid inflation?: *R. W. B. Clarke*. A critique of the national accounts: *G. L. Schwartz*.

May, 1939—Treasury control of the market: *Paul Bareau*. The valuation of gilt-edged.

June, 1939—An end to gold scares. (Full text of Mr. Morgenthau's correspondence with Senator Wagner.) Economics of American Foreign Policy. France's recovery.

July, 1939—Fire and accident insurance: *F. G. Culmer*.

Bankers' Magazine—

June, 1939—Afterthoughts on the Budget. A world survey of financial and economic developments.

July, 1939—The banking half-year. The crisis in New Zealand's finances: *Hugh C. Jenkins*.

Economic Journal, June, 1939—Supply of engineering labour under boom conditions: *R. G. D. Allen* and *B. Thomas*. Vertical integration and the iron and steel industry: *S. R. Dennison*. Size of firms in the boot and shoe industry: *H. C. Hillmann*. Presidential address: *Prof. A. C. Pigou*.

Economica, May, 1939—The assumptions of linear regression: *R. G. D. Allen* and *Henry Schultz*. The analysis of costs of retail distribution: *Arnold Plant* and *R. F. Fowler*.

Eugenics Review, April, 1939—The work of the Population Policies Committee: *François Lafitte*. External migration: *R. S. Walshaw*.

Institute of Actuaries, Journal, Vol. LXX. Part I, No. 327, 1939—Stock Exchange investments in theory and practice: *Sir Joseph Burn*. Opening address of President, *H. J. P. Oakley*. Mortality of Indian assured lives: *L. S. Vaidyanathan*.

UNITED KINGDOM—*Contd.*

Institute of Bankers, Journal, June, 1939—The lesson of the April stringency : *Norman Crump*.

Lloyds Bank Ltd., Monthly Review, May, 1939—British monetary policy : *D. H. Robertson*.

Manchester School of Economics and Social Studies, Vol. X, No. 1, 1939—The "Out of Work" enquiry of 1931 : *E. Brew*. Production trends in the United Kingdom : *E. Devons*. Under-employment in cotton weaving : *E. M. Gray*. Modern population trends : *R. F. Harrod*. Mr. Hawtrey on Bank Rate and the long-term rate of interest : *J. R. Hicks*. Central banks and the state : *F. B. Whale*.

Oxford Economic Papers, No. 2, May, 1939—British economic fluctuations 1924-38 : *E. H. Phelps Brown* and *G. L. S. Shackle*. Studies in mobility of labour : analysis for Great Britain, Pt. I : *H. Makower*, *J. Marschak* and *H. W. Robinson*. The multiplier in closed and open systems : *G. L. S. Shackle*.

Political and Economic Planning, No. 143, March, 1939—Report on the gas industry.

Review of Economic Studies, June, 1939—Elasticities of demand for tea and price-fixing policy : *E. J. Broster*. Trends in the "rigidity" of English wage rates : *J. T. Dunlop*. The excess burden of indirect taxation : *M. F. W. Joseph*. The process of unemployment in the Depressed Areas (1935-1938) : *H. W. Singer*.

Royal Agricultural Society, Journal, Vol. C, Pt. I, 1939—Crops and plant breeding : *G. D. H. Bell*. Farm economics : *C. S. Orwin*.

R. Meteorological Society, Quarterly Journal, April, 1939—Local climate and the growth of trees, with special reference to frost : *W. R. Day*. What happens to the rain? : *B. A. Keen*.

Sociological Review, April, 1939—Enrolments at German universities since 1933 : *Charlotte Luthens*. Correlation between fertility and intelligence within social classes : *Pearl Moshinsky*.

INDIA—

Indian Journal of Economics, April, 1939—(Conference Number : papers read and discussed at the twenty-second conference of the Indian Economic Association, Nagpur, 1938.)

AUSTRALIA—

Economic Record, April, 1939—Stabilization in a dependent economy : *H. Belshaw*. The marginal productivity of capital : *Colin Clark*. General theory and Swedish economic practice : *H. C. Coombs*. The political problems of a managed currency : *F. W. Eggleston*. The limits of monetary policy : *T. Hytten*.

UNION OF SOUTH AFRICA—

South African Journal of Economics, March, 1939—European population movements in the Union of South Africa: *D. V. Glass*. City Government: the Johannesburg experiment: *Prof. S. H. Frankel*.

UNITED STATES—

American Economic Review—

March, 1939—Double taxation of savings: *Irving Fisher*. Progress and declining population: *Alvin H. Hansen*. Wage rates in the general welfare: *Wilford I. King*. Petroleum regulation in South America: *D. M. Phelps*.

June, 1939—Technological conditions and employment of labour: *Edna Longan*. Nation's labor supply: *J. B. Parrish*. Labor movements of Great Britain and U.S.: *Norman J. Ware*.

Supplement, March, 1939—(Papers and proceedings of the fifty-first annual meeting of the American Economic Association.)

American Statistical Association, Journal—

March, 1939 Science and society: *R. H. Coats* (presidential address). Clearing variates in confluence analysis: *Hoist Mendershausen*. The effectiveness of institutional treatment: *George B. Vold*. Producers' goods prices in expansion and decline: *Lloyd G. Reynolds*. Concepts used in unemployment surveys: *John N. Webb*.

June, 1939 Some problems in teaching elementary statistics: *Lester S. Kellogg*. The construction of indexes of physical production: *Philip G. Hudson*. Some problems in teaching elementary statistics: *Lester S. Kellogg*. Representative sampling in large-scale surveys: *Frederick F. Stephan*. Notes on the interpretation of external statistics: *Q. Forrest Walker*. Collection and interpretation of inventory data: *Walter Mitchell, Jr.* Standard error of the coefficient of elasticity of demand: *Jacob L. Mosak*.

Annals of Mathematical Statistics, March, 1939—On the mathematics of the representative method of sampling: *A. T. Craig*. A contribution to the theory of self-renewing aggregates, with special reference to industrial replacement: *A. J. Lotka*. On a new class of "contagious" distributions applicable in entomology and bacteriology: *J. Neyman*.

Econometrica, April, 1939—Annual survey of statistical data: Pareto's law and the index of inequality of incomes: *C. Bresciani-Turroni*. The relation of prices to marginal costs in an optimum system: *Harold Hotelling*.

Harvard Business Review, Vol. XVII, No. 4, 1939—Voluntary control of unfair business practices: *Lincoln Filene*. European experiments in protecting small competitors: *Walter Frölich*. Pricing policies in the automobile industry: general considerations: *Homer B. Vanderblue*.

UNITED STATES—*Contd.*

Journal of Political Economy, April, 1939—Wage-rates, investment, and employment: *E. M. Bernstein*. The incidence of a general output or a general sales tax: *Harry Gunnison Brown*. Speculation and forward exchange: *Charles P. Kindleberger*. Currency issues to overcome depressions in Delaware, New Jersey, New York, and Maryland, 1715-37: *Richard A. Lester*.

Milbank Memorial Fund Quarterly, April, 1939 - Birth rates and socio-economic attributes in 1935: *Clyde V. Kiser*.

Quarterly Journal of Economics, May, 1939—The scale of agricultural production in the United States: *J. D. Black*, *R. H. Allen* and *O. A. Negaard*. The social cost of bad debt: *Erwin Graue*. Long cycles in the building industry, 1856-1935: *Clarence D. Long, Jr.*

Review of Economic Statistics, May, 1939—The relation of the economic life of equipment to reinvestment cycles: *Joe S. Bain*. Cyclical changes in corporate profits: *W. L. Crum*. Methods of measuring demand or consumption: *Elizabeth W. Gilboy*. On crisis and adjustment: *L. M. Lachmann*. Fluctuations in United States consumption, 1919-1932: a correction: *J. J. Polak*. Interactions between the multiplier analysis and the principle of acceleration: *Paul A. Samuelson*.

Social Research, May, 1939—The struggle for economic security in democracy (whole number).

Wheat Studies of the Food Research Institute, Vol. XV, No. 8, 1939—World wheat survey and outlook, May, 1939: *V. P. Timoshenko* and *Holbrook Working*.

DENMARK—

Nationaløkonomisk Tidsskrift—

Parts 1 2, 1939 - Nogle Finansieringsproblemer i den offentlige Husholdning: *E. Dige*. Wirtschaftslenkung und Wirtschaftsfreiheit in Frankreich: *Henry Laufenburger*.

Part 3, 1939—Britisk Landsbrug-og Handelspolitik: *S. Sørensen*. Omkring den moderne Pristeori, II: *H. W. Pedersen*.

EGYPT—

L'Égypte Contemporaine, February-March, 1939—A century of economic development 1837-1937 (a study in population and production in Egypt): *A. Crouchley*. Le procès du capitalisme: *I. G. Levi*. La mortalité infantile à Alexandrie: *F. Rosenfeld*.

FRANCE—

Bulletin de la Statistique Générale de la France, January-March, 1939—Méthode d'ajustement d'une série d'indices hebdomadaires. Application au chômage et au trafic ferroviaire: *A. Sauvy* and *P. Depoid*.

FRANCE—*Contd.**Journal des Économistes*—

January-February, 1939—La Tchécoslovaquie nouvelle: *P. Borodaeuwsky*. Les fonds d'égalisation des changes: *Dr. Jules Domany*. Les ambitions et les difficultés de l'Allemagne: *Edouard Payen*.

March-April, 1939—La production et les pérégrinations de l'or, témoignages de l'insécurité mondiale: *E. P.* L'Année 1938 dans l'économie polonaise: *C. de Kownacki*.

Journal de la Société de Statistique de Paris—

April, 1939—Politique démographique des états totalitaires: *M. Bunle*. L'organisation de l'enseignement de la statistique en Italie: *M. Vacchini*.

May, 1939—La cinquième révision décennale des nomenclatures internationales des causes de décès: *Michel Huber*. Statistique et capitalisation: *M. Huméry*.

June, 1939—Clement Colson: *M. F. Divisia*. Marine marchande: *M. F. Divisia*.

Revue des Assurances Sociales—

January February, 1939 Die Gesundheitsfürsorge in der deutschen Sozialversicherung: *Heinrich Grote*. Les précédents de la prévoyance sociale au moyen âge: *Armando Sapori*.

Supplément, November-December, 1938—Les mutuelles maladies des travailleurs de l'industrie en Italie en l'année 1937: *N. Bonfatti*. L'assistance sociale dans l'empire romain: *F. Orestano*.

Revue d'Économie Politique

January February, 1939—De la France d'avant guerre à la France d'aujourd'hui (whole number).

March-April, 1939—La nationalisation des usines de guerre: *Paul Reuter*. Organisation économique de la nation en temps de guerre: *Commandant Wurmser*.

GERMANY—

Allgemeines Statistisches Archiv, Vol. 28, Part III, 1939 Sinn und Aufbau einer allgemeinen Verbrauchskennziffer: *Prof. Charlotte Lorenz*. Annullierte Volkszählung 1937 und Bevölkerungsstand in der Sowjetunion: *Prof. W. von Poletika*.

Archiv für mathematische Wirtschafts- und Sozialforschung—

Vol. V, Part I, 1939—Pareto's Funktion und ihre Anwendung zur rationellen Berechnung der Versicherungstarife in der Automobilversicherung: *V. Myslivce*. Die Verteuerung einer monopolisierten Ware durch eine Verbrauchssteuer: *U. Ricci*. Der Schwerpunkt der Alterspyramide: *F. Savorgan*. Preisdiskrimination bei willkürlicher Teilung des Marktes: *H. v. Stackelberg*.

GERMANY—*Contd.*

Vol. V, Part II, 1939—Beitrag zum Problem von Bernoulli : *A. Baumberger*. Die Sterblichkeit nach dem Körpergewicht : *Helmut Blümel*. Ein Wahrscheinlichkeitsproblem in der Kundenwerbung : *Hans Münzner*.

Blätter für Versicherungs-Mathematik, Vol. IV, Part 9, 1939—Neuere Ergebnisse der mathematischen Statistik : *Paul Riebesell*. Neue Sterbetafeln für Leibrentenversicherungen : *R. Schönwiese*.

Vierteljahrshefte zur Wirtschaftsforschung, Part 4, 1938-39—Japans Kriegsfinanzierung : *Richard Seiler*. Das Frachtraumproblem im Weltkriege : *Heinrich Stübel*.

Weltwirtschaftliches Archiv, Part III, May, 1939—Die Verbesserung des Ernährungsstandards und die Umleitung der produktiven Kräfte : *Allan G. B. Fisher*. Devisenbewirtschaftung als neue Währungsform : *Fritz Meyer*.

Zeitschrift für die gesamte Versicherungs-Wissenschaft, Part II, June, 1939—Zur Neuordnung der Ausbildung von Mathematikern für Lehramt und Praxis : *A. Timpe*. Die versicherte Gruppe als soziales Gebilde : *E. Weinreich*.

ITALY—

Annali di Statistica, Vol. III, Part 7.—Indagine statistica sulle disponibilità alimentari della popolazione italiana del 1922 al 1937 : *B. Barberi*.

Economia—

April, 1939 - Il problema dell'oro : *Luigi Fabbrini*.

June, 1939 -Sulle variazioni della attitudine genetica della donna secondo l'età : *Livio Livi*.

Giornale degli Economisti e Annali di Economia, January-February, 1939—Le basi logiche dell'economia dinamica nel clima scientifico odierno : *G. Demaria*. Osservazioni sulle tavole di fecondità : *Libero Lenti*. Recenti vedute teoriche inglesi sulle disoccupazione : *G. U. Papi*.

Rivista di storia economica, March, 1939—La dottrina dei "costi comparati" ed i suoi critici : *Attilio Cabiati*.

JAPAN—

Kyoto University Economic Review, April, 1939—The incidence of taxation upon the rural population under war conditions : *Professor S. Shiomi*.

SWITZERLAND—

Zeitschrift für schweizerische Statistik und Volkswirtschaft, Part I, 1939 - Die Finanzkraft der Schweiz : *Prof. Eugen Grossmann*. Die Rolle des Goldes in der Währungspolitik : *E. Kellenberger*.

INTERNATIONAL—

International Labour Review—

April, 1939—The diversity of co-operative societies and their classification : *G. Fauquet*. The economic and social effects of industrial development in Hungary : *Mark Mitnitzky*.

May, 1939—Trade unionism as a factor in recent American wage movements : *Z. Clark Dickinson*.

June, 1939 - A programme for family security in Sweden : *Alva Myrdal*. The organization of immigration and land settlement in Venezuela (I) : *E. Siuwers*.

July, 1939 -Family allowances in Norway. The organization of immigration and land settlement in Venezuela (II) : *E. Siuwers*.

International Review of Agriculture—

February, 1939 International organisation of the cacao market : *F. Arcolco*.

March, 1939—The proportion of estates and of native holdings in the world production of rubber : *W. Bally*.

Revue de l'Institut International de Statistique, Pt. IV, 1938—
Études scientifiques d'ordre statistique : *F. Žižek*.

LIST OF ADDITIONS TO THE LIBRARY

Since the issue of Part II, 1939, the Society has received the publications enumerated below :—

I.—OFFICIAL PUBLICATIONS.

(a) United Kingdom.

- Agriculture and Fisheries, Ministry of.* Bulletin no. 78. A selected and classified list of books in English relating to agriculture etc. in the Library of the Ministry of Agriculture. London: H.M.S.O., 1939. 9 $\frac{1}{4}$ " \times 6". vi + 27 pp. 6d.
- The bacon marketing scheme 1933 as amended to 30th September 1938. London: H.M.S.O., 1939. 9 $\frac{1}{4}$ " \times 6". 16 pp. 4d.
- Health, Ministry of.* Reports on Public Health and Medical Subjects. No. 71. (Revised edition.) The bacteriological examination of water supplies. London: H.M.S.O., 1939. 9 $\frac{1}{4}$ " \times 6". vii + 59 pp. 1s.
- Home Office.* The psychological treatment of crime, by W. Norwood East, and W. H. de B. Hubert. London: H.M.S.O., 1939. 9 $\frac{1}{4}$ " \times 6". iii + 166 pp. 2s. 6d.
- Imperial Economic Committee.* 32nd report. A survey of the trade in canned food. London: H.M.S.O., 1939. 9 $\frac{1}{4}$ " \times 6". vi + 170 pp. 2s. 6d.
- Labour, Ministry of.* Schedule of reserved occupations. (Provisional: revision May 1939.) London: H.M.S.O., 1939. 9 $\frac{1}{4}$ " \times 6". 63 pp. 6d.
- Medical Research Council.* Special report series No. 233. Appendicitis: a statistical study by Matthew Young and W. T. Russell. London: H.M.S.O., 1939. 9 $\frac{1}{4}$ " \times 6". 64 pp. 1s.
- Meteorological Office.* Professional notes No. 88. Fog on the mainland of Scotland, by F. E. Dixon. London: H.M.S.O., 1939. 9 $\frac{1}{4}$ " \times 6". 19 pp. 6d.
- Northern Ireland, General Register Office.* Census of population of Northern Ireland 1937. Supplement to the 1926 topographical index. Belfast: 13 $\frac{1}{4}$ " \times 8". ix + 15 pp. 1s.
- Overseas Trade, Department of.* Reports: 724. Australia, December 1938. 211 pp. 3s. 6d. 725. Hungary, March 1939. 46 pp. 1s. 726. Estonia, March 1939. 34 pp. 9d. London: H.M.S.O., 1939. 9 $\frac{1}{4}$ " \times 6".
- Scotland, Department of Health for.* Report of a committee on Scottish building costs. Edinburgh: H.M.S.O., 1939. Cmd. 5977. 9 $\frac{1}{4}$ " \times 6". 44 pp. 9d.
- Trade, Board of.* Final report on the fifth census of production and the Import Duties Act inquiry 1935 Part II. The iron and steel trades. The engineering, shipbuilding and vehicles trades. The non-ferrous metals trades. London: H.M.S.O., 1939. 9 $\frac{1}{4}$ " \times 6". xviii + 553 pp. 8s.
- Transport, Ministry of.* Transport Advisory Council. Report on the proposals of the main-line railway companies as to the conveyance of merchandise by rail. London: H.M.S.O., 1939. 9 $\frac{1}{4}$ " \times 6". 95 pp. 1s. 6d.
- Treasury.* Report of the Committee on Pensions for Unmarried Women. London: H.M.S.O., 1939. 9 $\frac{1}{4}$ " \times 6". 78 pp. 1s. 3d.
- Report of the Departmental Committee on the Imposition of Penalties by Marketing Boards and other similar bodies. London: H.M.S.O., 1939. 9 $\frac{1}{4}$ " \times 6". 56 pp. 1s.

(b) British Empire.

Australia—

Commonwealth and state income taxes for the financial year 1938-39 . . .
 Canberra: 1939. 10" × 8". 71 pp.

Commonwealth Forestry Bureau. Bulletin No. 21. Application of statistical methods to some Australian forest problems (Vol. I) by *T. N. Stoate* and *C. E. Lane.* Canberra: 1938. 10" × 8". 74 pp.

Ceylon—

Report of a Commission on immigration into Ceylon, by *Sir Edward St. J. Jackson.* (Sessional paper III—1938.) Colombo: 1938. 13" × 8½". 45 pp.

Eire—

Department of Industry and Commerce. Ireland census of population 1936. Vol. V, Part I. Ages, orphanhood and conjugal conditions classified by areas only. Dublin: Stationery Office, 1939. 10" × 6½". viii + 230 pp. 2s. 6d.

Palestine—

Department of Migration. Annual report 1938. Jerusalem: Government Printer, 1939. 9½" × 6½". 205 pp. 3s.

Union of South Africa—

Census Office. Sixth census of the population . . . enumerated 5th May 1936. Vol. III, Marital condition of the European, Asiatic and coloured population. 1938. xxxiv + 180 pp. Vol. IV. Languages: official and home languages spoken by the European, Asiatic and coloured population. 1939. xxviii + 168 pp. Ages and marital condition of the Bantu population. xxii + 46 pp. Pretoria: 12" × 9½". 3 vols.

(c) Foreign Countries

Argentina—

Buenos Aires, Municipalidad de la Ciudad de. Cuarto censo general 1936. Poblacion 22.x.1936. Tomo II. Masculinidad. Lugar de nacimiento. Alfabetismo. Buenos Aires: 1939. 12" × 9". xii + 464 pp.

Austria—

Bundesamt für Statistik. Statistisches Handbuch für die Republik Österreich. II, 1921. VIII-X, 1927-1929. XII-XIV, 1931-1933. Vienna: 1921-1933. 9¾" × 6½". 7 vols. (From Prof. S. J. Lengyel.)

Statistisches Handbuch für den Bundesstaat Österreich. XV, 1935. XVII, 1937. Vienna: 1935-1937. 9¾" × 6½". 2 vols. (From Prof. S. J. Lengyel.)

Statistische Zentralkommission. Österreichisches Statistisches Handbuch . . . 1915. Vienna: 1917. 10" × 6½". xi + 367 pp. (From Prof. S. J. Lengyel.)

Belgium—

Office Central de Statistique. Recensement économique et social au 27 février 1937. Recensement des établissements industriels et commerciaux. Province de Hainaut. Province de Liege. Brussels: 1938. 12¼" × 9½". 2 vols.

Recensement général de la population au 31 décembre 1930. Tome vii. Tables de mortalité de la population Belge 1928-1932. 62 pp. Tome viii. Recensement des familles. 71 pp. Brussels: 1938. 12¼" × 9½". 2 vols.

(c) Foreign Countries—Contd.

Bulgaria—

Direction Générale de la Statistique. Statistique des bois et forêts 1935-36. Sofia: 1939. 11½" × 8". xvii + 116 pp.

Colombia—

Dirección General de Estadística. Anuario general de estadística 1937, Bogota: 1938. 11¼" × 8". xiii + 623 pp.

Estonia—

Bureau Central de Statistique. Artisanat: données du recensement économique de 1937, Vol. II. Tallinn: 1939. 10¼" × 7¼". 71 pp.

France—

Ministère des Finances. Renseignements statistiques publiés par l'administration des finances. Paris: 1939. 12" × 9". 60 pp.

Germany—

Statistisches Reichsamt. Statistik des Deutschen Reichs, Band 498. Die deutsche Verbrauchsbesteuerung 1935-36 bis 1937-38. 312 pp. Band 511, III. Umsatzsteuerstatistik 1935. III Teil, Einzelergebnisse für die Gewerbeabteilung Handel und Verkehr. 201 pp. Band 527. Die Verbreitung von Tierseuchen und die Ergebnisse der Schlachtvieh- und Fleischbeschau im Jahre 1936, 123 pp. Berlin: 1939. 12" × 8½". 3 vols.

Hungary—

Office Central Royal Hongrois de Statistique. Magyar statisztikai évkönyv. xxii, 1914. xxxi-xxxiii, 1923-1925. xxxvi, 1928. xl, 1932. Budapest: 1916-1933. 10½" × 7". 4 vols. (From Prof. S. J. Lengyel.)

Iceland—

Bureau de Statistique. Recensement de la population de l'Islande le 2 décembre 1930. Reykjavik: 1937. 9¾" × 6". 67 + 169 pp.

Italy—

Istituto Centrale di Statistica. VIII Censimento generale della popolazione 21 aprile 1936. Vol. I. Atti del censimento, Parte seconda, Atti relativi alle classificazioni professionali iv + 149 pp. Vol. IV. Professioni. Parte II, tavole. (a) Agricoltura, x + 197 pp. (b) Industria, commercio ecc. condizioni non-professionali. 1. Regno, xvi + 758 pp. 2. Province xv + 270 pp. Vol. V. Libia, Isole italiane dell'Egeo, Tientsin. Rome: 1939. 12" × 9". 5 vols.

Luxembourg—

Statistisches Amt. Publikationen des Statistischen Amtes, Heft 74. Der Viehstand des Grossherzogtums nach den Zählungen vom 1 Dezember 1934 und vom 1 Dezember 1937. 62 + 25 pp. Heft 75, Statistik der Landwirtschaft . . . 1938. 32 pp. Luxemburg: 1939. 9¼" × 6¼".

Netherlands—

Amsterdam, Municipal Bureau of Statistics. Statistical communications No. 103a. Population phenomena in Amsterdam. (English translation of principal parts of Statistical communication No. 103.) 39 + 56 + 56 pp. 1939. No. 109. Quelques chiffres concernant le Port d'Amsterdam dans la période 1929-1937. 36 pp. 1938. Amsterdam: 9½" × 6¼". 2 vols.

(c) Foreign Countries—Contd.

Norway—

Det Statistiske Sentralbyrå. Norges Offisielle Statistik, IX, 158. Bedriftstelling i Norge 9 oktober 1936. Første hefte. Detaljerte oppgaver for de enkelte næringsgrupper. Oslo: 1939. $9\frac{1}{2}'' \times 6\frac{1}{4}''$. 21 + 526 pp.

Poland—

Office Central de Statistique. Statistique de la Pologne Serie C. 94c, 94d. Deuxième recensement général de la population du 9 décembre 1931. Professions- population hors l'agriculture. Pologne. 2 vols. Serie C. 102. Mariages, naissances et décès 1931, 1932. Warsaw: 1939. $11\frac{1}{4}'' \times 8''$. 288 pp.

Sweden—

Socialstyrelsen. Arbetsförhållandena inom det husliga arbetet å landsbygden. Stockholm: 1939. $9\frac{1}{2}'' \times 6\frac{1}{2}''$. 140 pp.
Statistiska Centralbyrån. Särskilda folkräkningen 1935-36, V. Partiella folkräkningen 1 mars 1936: Arbetsoförmåga och arbetslöshet. Stockholm: 1939. $9\frac{1}{2}'' \times 6\frac{1}{2}''$. xiii + 151 + 57 pp.

Switzerland—

Bureau Fédéral de Statistique. Statistiques de la Suisse, 88. Contribution fédérale de crise. Résultats de la II^{me} période 1936-1937. Administration fédérale des contributions. Bern: 1939. $11\frac{3}{4}'' \times 8\frac{1}{4}''$. 92 pp.

U.S.A.—

United States Tariff Commission. Trade agreement between the United States and the United Kingdom. Vol. I. Introduction: an analysis of the agreement. iv + 266 pp. Vols. II-VIII. Digests of trade data with respect to products on which concessions were granted by the United States. 8 vols.

Second trade agreement between the United States and Canada. Vols. I-II, Vol. III parts I and II, Vol. IV. Washington: U.S. Tariff Commission. 1938. $9\frac{1}{2}'' \times 6\frac{1}{2}''$. 5 vols. (From Mr. J. Menken.)

Works Progress Administration, Division of Social Research. Rural families on relief, by C. C. Zimmerman and N. L. Whetten. (Research monograph xvii.) Washington: Government Printing Office, 1938. $10'' \times 7''$. xxiv + 161 pp.

(d) International

International Institute of Agriculture—

The world wheat situation in 1938-39. Rome: 1939. $9\frac{1}{2}'' \times 6\frac{1}{4}''$. 96 pp. 20 lire.

International Labour Office—

Studies and reports Series D. No. 22. The minimum wage: an international survey. Geneva: 1939. (London: P. S. King). $9\frac{1}{2}'' \times 6\frac{1}{4}''$. vii + 257 pp. 5s.

League of Nations—

Economic and Financial Section. Studies and reports on statistical methods. No. 5. Housing statistics: a minimum programme of housing statistics drawn up by the Committee of Statistical Experts. 14 pp. No. 6. Indices of industrial production: report drawn up by the Committee of Statistical Experts. 16 pp. Geneva: 1939. (London: Allen & Unwin.) $10\frac{1}{2}'' \times 8''$. 2 parts.

II.—AUTHORS AND MISCELLANEOUS

- Actualités Scientifiques et Industrielles. 649. Exposés de géométrie X. Les fonctions de matrices, I. Les fonctions univalentes, par *Hans Schwerdtfeger*. 1938. 59 pp. 20 f. 650. Exposés d'analyse générale, VIII. Essai d'explication des crises économiques par l'économetrie, par *B. Chait*. 1938. 52 pp. 15 f.
- Exposés sur la théorie des fonctions. 657, XI. Les fonctions multivalentes, par *M. Biernacki*. 1938. 66 pp. 20 f. 660, XII. La notion de point irrégulier dans le problème de Dirichlet, par *Florin Vasilescu*. 1938. 61 pp. 20 f. 733, XIII. La régularisation des fonctions, par *S. Mandelbrojt*. 1938. 35 pp. 15 f.
- Conférences Internationales de Sciences Mathématiques organisées à l'Université de Genève. . . . Colloque consacré à la théorie des probabilités, et présidé par *M. Maurice Fréchet*. 734, I. Conférences d'introduction . . . 1938. 51 pp. 15 f. 735, II. Les fondements du calcul des probabilités, par *MM. P. Cantelli, W. Feller, M. Fréchet, R. de Misès, J. F. Steffensen*, et *A. Wald*. 1938. 99 pp. 25 f. 736, III. Les sommes et les fonctions de variables aléatoires, par *MM. H. Cramér, P. Lévy*, et *R. de Misès*. 1938. 68 pp. 20 f. 737, IV. Le principe ergodique et les probabilités en chaîne, par *MM. E. Hopf, B. Hostinsky, O. Onicescu, V. Romanovsky*. 1938. 66 pp. 18 f. 738, V. Les fonctions aléatoires, par *MM. S. Bernstein, E. Slutsky, A. Steinhaus*. 1938. 73 pp. 20 f. 739, VI. Conceptions diverses, par *M. B. de Finetti, V. Glivenko, G. Neyman*. 1938. 57 pp. 15 f. 740, VII. La statistique mathématique, par *MM. E. Dodgson, C. Jordan, N. Obrechhoff*. 1938. 64 pp. 18 f. Paris: Hermann & Cie. 1938. 10" x 6½".
- Assekuranz-Jahrbuch, Gegründet 1880 von A. Ehrenzweig . . . herausgegeben von Prof. S. J. Lengyel. 29, 1908. 32-34, 1911-13. 41, 1921. 44-46, 1924-27. 48, 1929. 50-57, 1931-38. Vienna and Leipzig: 1908-38. 8" x 5½". 17 vols. (From Prof. S. J. Lengyel.)
- Bank für deutsche Industrie-Obligationen. Geschäftsbericht über das vierzehnte Geschäftsjahr (1 April 1937 bis 31 März 1938). Berlin: 1939. 11½" x 8½". 31 pp.
- Berg (*William N.*) Statistical basis of errors in immunity tests. Reprinted from the *American Review of Tuberculosis*, March 1938, pp. 259-63. 10" x 7".
- Statistical interpretation of data in experimental tuberculosis. Reprinted from *Tubercle*, Aug. 1936, pp. 496-502. 9½" x 7".
- Beveridge (*Sir William*). Prices and wages in England from the twelfth to the nineteenth century. Vol. 1. Price tables: mercantile era . . . with the collaboration of *L. Liepmann, F. J. Nicholas, M. E. Rayner, M. Wretts-Smith*, and others. London: Longmans, 1939. 9½" x 6". lx + 756 pp. 31s. 6d.
- Bopp (*Karl R.*). Hjalmar Schacht: central banker. (The University of Missouri Studies, Vol. xiv, No. 1, Jan. 1939.) Columbia: University of Missouri, 1939. 10½" x 7½". 91 pp. \$1.25.
- Butler, (*H. B.*). The economic factor in international affairs. Manchester University Press, 1939. 8½" x 5½". 36 pp. 1s.
- Clark (*Colin*). A critique of Russian statistics. London: Macmillan, 1939. 8½" x 5½". v + 76 pp. 6s.
- Cochran (*W. G.*). Note on J. B. S. Haldane's paper: "The exact value of the moments of the distribution of χ^2 ." Reprinted from *Biometrika*, Vol. xxix, Parts iii & iv, 1938. 9½" x 7½". 1 pp.
- De Kock (*M. H.*). Central banking. London: P. S. King, 1939. 8½" x 5½". xiv + 354 pp. 15s.
- Eden (*Sir Frederick Morton, Bart.*). An estimate of the number of inhabitants in Great Britain and Ireland . . . London: Printed for J. Wright, 1800. 9" x 5½"; [4] + 93 pp. (From Mr. G. Udny Yule.)
- Fisher (*R. A.*). Statistical theory of estimation. (Calcutta University Readership Lectures.) Calcutta: 1938. 8½" x 5½". 45 pp.
- Fenelon (*K. G.*). Management and labour. London: Methuen, 1939. 7½" x 5". vi + 276 pp. 7s. 6d.
- Ford (*P.*). Incomes, means tests and personal responsibility. London: P. S. King, 1939. 8½" x 5½". ix + 86 pp. 5s.

II.—Authors and Miscellaneous—Contd.

- Frankfurter Zeitung. Börsen- und Wirtschafts-Kalender. 67-9, 1930-32. 72, 1935. Frankfurt: 1930-35. $10\frac{1}{2}'' \times 7\frac{1}{4}''$. 4 vols. (From Prof. S. J. Lengyel.)
- General Motors Corporation. The dynamics of automobile demand: based upon papers presented at a joint meeting of the American Statistical Association and the Econometric Society in Detroit, Michigan, on December 27, 1938. New York: General Motors Corporation, 1939. $11'' \times 8\frac{1}{2}''$. ix + 139 pp.
- Goulden (C. G.). Methods of statistical analysis. New York: John Wiley (London: Chapman & Hall), 1939. $9'' \times 6''$. vii + 277 pp. 17s. 6d.
- Griffin (John I.). Strikes: a study in quantitative economics. New York: Columbia University Press, 1939. (London: P. S. King.) $8\frac{3}{4}'' \times 6''$. 319 pp. 16s.
- Guillebaud (C. W.). The economic recovery of Germany from 1933 to the incorporation of Austria in March 1938. London: Macmillan, 1939. $8\frac{1}{2}'' \times 5\frac{1}{2}''$. xiv + 303 pp. 10s. 6d.
- Harrison (G.) and Mitchell (F. C.). The home market: 1939 edition revised and enlarged; edited by M. A. Abrams: a book of facts about people . . . London: Allen & Unwin, 1939. $10'' \times 7\frac{1}{2}''$. xvi + 151 pp. 12s. 6d.
- Heilperin (Michael A.). International monetary economics. London: Longmans, 1939. $8\frac{1}{2}'' \times 5\frac{1}{2}''$. xiv + 281 pp. 15s.
- Hill (A. Bradford). Principles of medical statistics. 2nd ed. London: "The Lancet," 1939. $8\frac{1}{2}'' \times 5\frac{1}{2}''$. vii + 189 pp. 6s.
- Some observations on the weight and length of infants in the first year of life. Reprinted from the *Medical Officer*, Oct. 8 and 15, 1938. $12'' \times 8\frac{3}{4}''$. 7 pp.
- Hill (A. Bradford) and Hyder (M. G.). Construction of an abridged life-table. Reprinted from "The Lancet," Jan 28, 1939. $8\frac{1}{2}'' \times 5\frac{1}{2}''$. 4 pp.
- Hübner (Otto). Hübner's Weltstatistik. 73. Ausgabe 1939 von Otto Hübner's Geographisch-Statistischen Tabellen aller Länder der Erde. Neu bearbeitet von Dr. Ernst Roesner. Vienna: L. W. Seidel und Sohn, 1939. $12'' \times 9''$. 327 pp.
- International Rubber Regulation Committee. Statistical bulletin . . . Vol. I, No. 1, January 1935 to Vol. 5, No. 4, April 1939 inclusive. London: I.R.R.C., 1935-39. $12'' \times 9\frac{1}{2}''$. 52 parts. (From the Secretary.)
- International Statistical Institute. Aperçu de la démographie des divers pays du monde 1929-36. The Hague: Office Permanent de l'Institut, 1939. $10\frac{1}{2}'' \times 7\frac{1}{4}''$. 433 pp. Fl. 8.
- Jahrbuch für Polen 1929-30. Warsaw: Instytut Wydawniczy "Biblioteka Polska." $7\frac{1}{2}'' \times 5''$. xii + 703 pp. (From Prof. S. J. Lengyel.)
- Johns Hopkins University. Collected papers from the Department of Biology of the School of Hygiene and Public Health of the Johns Hopkins University. Volume XV. Baltimore, Maryland: 1938. $9\frac{1}{4}'' \times 6\frac{3}{4}''$. (From Prof. Raymond Pearl.)
- Kemény (Georg), Mitnitsky (Mark), and Vágá (Josef). Wirtschaftsjahrbuch des Pester Lloyd. Die Volkswirtschaft Ungarns im Jahre 1936. Budapest: Verlag des Pester Lloyd, 1937. $9'' \times 6''$. 371 pp. (From Prof. S. J. Lengyel.)
- Knight (A. W.). What's wrong with the economic system? London: Longmans, 1939. $8\frac{1}{2}'' \times 5\frac{1}{2}''$. xiii + 179 pp. 8s. 6d.
- Koopmans (T.). Tanker freight rates and tankship building: an analysis of cyclical fluctuations. (Publications of the Netherlands Economic Institute, Nr. 27.) Haarlem: De Erven F. Bohn, 1939. (London: P. S. King.) $9\frac{1}{2}'' \times 6\frac{1}{4}''$. xii + 222 pp. 7s. 6d.
- Leavens (Dickson H.). Silver money. (Cowles Commission for Research in Economics, Monograph No. 4). Bloomington, Indiana: Principia Press Inc., 1939. $9\frac{1}{2}'' \times 6\frac{1}{2}''$. xix + 439 pp. \$4.
- Liverpool (University of). Social Science Department: Statistics Division. Population problems of new estates, with special reference to Norris Green. Liverpool: The University Press, 1939. $8\frac{1}{2}'' \times 5\frac{1}{2}''$. 51 pp. 1s.
- Lyon (Université de). Travaux de l'Institut de Science Financière et d'Assurances. 78. La distribution des inondations, par E. J. Gumbel. 9 pp. $8\frac{1}{2}'' \times 5\frac{1}{2}''$. 79. Gli eventi compatibili, E. J. Gumbel. 38 pp. $9\frac{1}{2}'' \times 6\frac{1}{2}''$. 80. Les principes de la mesure des corrélations, par H. Eyraud. 1 p. $10\frac{1}{2}'' \times$

II.—Authors and Miscellaneous—Contd.

- 8½". 81. Statistique—Le débit de crue médian au cours des années : Note de *E. J. Gumbel*. 3 pp. 10½" × 8½". 82. Statistique mathématique—Sur l'analyse des aléatoires et le problème de l'hérédité : Note de *G. Malécot*. 3 pp. 10½" × 8½". 84. Statistique—Les valeurs de position d'une variable aléatoire : Note de *E. Gumbel*. 3 pp. 10½" × 8½". Lyon : 1938–39. 6 parts.
- Myrdal (Gunnar)*. Monetary equilibrium. London : William Hodge, 1939. 8½" × 5½". xi + 214 pp. 12s. 6d.
- Pirou (Gaëtan)*. Les nouveaux courants de la théorie économique aux États-Unis. Tome I, Les précurseurs. 2nd ed. Paris : Les Éditions Domat-Montchrestien, 1939. 9" × 5½". 347 pp. 85 f.
- Punjab Board of Economic Inquiry. Publication No. 61. Tanning industry in the Punjab : inquiry conducted by *Roshan Lal Anand*. xi + 127 pp. 1 rupee. Publication No. 62. Family budgets, 1936–37, of eleven cultivators in the Punjab. . . . vii + 63 pp. 12 annas. Lahore : *C. and M. Gazette*, 1939. 9½" × 6".
- Qureshi (Anwar Iqbal)*. State banks for India : being a study of the state banks and mortgage credit institutions in Australia, New Zealand, South Africa and the United States of America, with suggestions for establishing similar banks in India. London : Macmillan, 1939. 8½" × 5½". viii + 248 pp. 12s. 6d.
- Revue des revues littéraires et scientifiques hongroises de l'année 1936. Editée par l'Association Nationale des Sociétés et des Institutions Scientifiques de Hongrie, avec le concours du Centre d'Études Hongroises en France. I. Lettres sciences sociales. Paris : Ernest Leroux, 1937. 9½" × 6½". 171 pp.
- Robbins (Lionel)*. The economic basis of class conflict, and other essays in political economy. London : Macmillan, 1939. 7½" × 4½". xiv + 277 pp. 6s.
- Rossi-Ragazzi (Bruno)*. L'apprezzamento medio esterno della lira nel triennio 1935–37. Rome : Confederazione Fascista dei Lavoratori del Commercio. Collana di propaganda e studi, 45. 1938. 9½" × 6½". 63 pp.
- Royal Institute of International Affairs. South-Eastern Europe : a political and economic survey prepared by the Information Department . . . in collaboration with the London and Cambridge Economic Service. London : R.I.I.A. and Oxford University Press, 1939. 9" × 6". xvi + 203 pp. 5s.
- Sarkar (Benoy Kumar)*. Economic development : studies in applied economics and world economy. Vol. II, Comparative industrialism and its equations, with special reference to economic India. Calcutta : Chuckervertty Chatterjee & Co., 1938. 8½" × 5½". xiii + 308 pp. Rs. 6.
- Sée (Henri)*. Histoire économique de la France. Vol. I. Le moyen âge et l'ancien régime. Paris : Armand Colin, 1939. 10" × 6½". xxv + 453 pp. 70 f.
- Stevens (W. L.)*. The completely orthogonalized latin square. Reprint from *Annals of Eugenics*, Vol. ix, Pt. 1, 1939. pp. 82–93. 10½" × 7½".
- Distribution of groups in a sequence of alternatives. Reprint from *Annals of Eugenics*, Vol. ix, Pt. 1, 1939, pp. 10–17. 10½" × 7½".
- Integration and interpolation. Reprint from *Annals of Eugenics*, Vol. viii, Pt. IV, 1938, pp. 387–401. 10½" × 7½".
- Tests of significance for extra sensory perception data. Reprinted from *Psychological Review*, March 1939, pp. 142–50. 9½" × 6½".
- Stuart-Williams (Sir Charles) and Short (Ernest)*. Railways, roads and the public. London : Eyre and Spottiswoode, 1939. 8½" × 5½". 157 pp. 3s. 6d. (From the British Railways Stockholders Union.)
- "Taxation" key to income tax, surtax and national defence contribution. . . . 5th ed. London : Taxation Publishing Co., 1939. 8½" × 5½". 160 pp. 3s. 6d.
- Tschuprow (A. A.)*. Principles of the mathematical theory of correlation . . . translated by M. Kantorowitsch. London : William Hodge, 1939. 8½" × 5½". x + 194 pp. 12s. 6d.
- Waight (Leonard)*. The history and mechanism of the exchange equalization account. Cambridge : University Press, 1939. 8½" × 5½". xiii + 191 pp. 8s. 6d.

II.—Authors and Miscellaneous—Contd.

Wirtschaftsstatistisches Jahrbuch 1927. Herausgegeben von der Kammer für Arbeiter und Angestellte in Wien. Vienna: 1928. 9" × 6". 556 pp. (From Prof. S. J. Lengyel.)

Woytinsky (W. S.). Seasonal variations in employment in the United States . . . a report prepared for the Committee on Social Security. Washington: Social Science Research Council, 1939. 9" × 6". x + 154 pp. \$1.50 (paper).

Wright (Carl Major). Economic adaptation to a changing world market. Copenhagen: Ejnar Munksgaard, 1939. 8½" × 5½". 305 pp. 10s. 6d.

Yates (F.) and Cochran (W. G.). The analysis of groups of experiments. Reprint from *Journal of Agricultural Science*, Oct 1938, pp. 556-80. 10" × 7".

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THE CAPITAL MARKET OF TO-DAY

[A Discussion before the ROYAL STATISTICAL SOCIETY on May 16th, 1939, the
PRESIDENT, PROFESSOR A. L. BOWLEY, C.B.E., in the Chair.]

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WHEN I suggested the subject for this discussion, I had in mind various features in the structure of the capital market, the discussion of which might serve as a useful pointer to future research. It is a subject in which there is a notable deficiency of statistical material of a definitive character, and I fear that the rather brief time available since the subject was determined has not sufficed for as thorough an examination as I could have wished of the data existing. I must, therefore, shelter behind the convention which allows the opener of a discussion as opposed to the reader of a paper to approach the Society in a spirit of complete humility, frankly expressing the hope that he will learn more from the discussion than he has himself contributed.

The ownership of the nation's capital has been too fully examined in recent years by Mr. Campion and others for any extensive discussion to be needed under this head. Certain aspects of the structure of this ownership are, however, relevant to any critical analysis of the facilities offered by the capital market, and this must serve as excuse for re-traversing some of the ground with this end in view. Much has been written in recent years concerning the comparative concentration of wealth in few hands, which was ascribed by Professor Henry Clay, in his Presidential Address to the Manchester Statistical Society in 1925, to the low proportion of the country's economic life represented by agriculture and other forms of activity in which small enterprise predominates. He pointed out, at the same time, that the ownership of little in the way of capital assets had not prevented the wage earner's attainment of a standard of life which is high in comparison with countries in which capital ownership is more widely spread. There has, nevertheless, been a widespread feeling that

social benefits would accrue through a wider diffusion of ownership, particularly in view of the inevitable electoral problems involved.

It is now accepted that this process of diffusion, gradual though it is, has been in progress for some time; and the chief problems connected with the capital market are connected with the adequacy of existing institutions to deal with the progressive modifications in the structure of ownership. Mr. Campion's analysis, in *Public and Private Property in Great Britain*, in so far as it relates to property in private hands, shows definite signs of diminishing inequality, and the change appears to have fallen into two rather definite stages. As between 1911-13 and 1926-8, there was a considerable rise both in the proportion of property held in estates of over £100 and in the proportion of owners who came into this category. This change is evidently attributable, at least in part, to changes in prices as between the pre-war and the post-war period, and falls to be contrasted with the change in the following ten years, as measured by the figures for 1936. In this period the proportion of property in the over-£100 class had increased to only a slight extent; but the proportion of owners had shown a rise large enough to be considered a significant confirmation of the pre-existing tendency.

Mr. Campion also points out the large increase in the amount of property in public ownership which, since the beneficial enjoyment of the facilities provided by it accrues principally to the smaller savers, serves to diminish the real inequalities of distribution. The instruments of diffusion have, of course, been the payment of death duties and the steep graduation of direct taxation upon incomes in the higher ranges. Mr. Campion quotes from a House of Commons debate an estimate that income tax, surtax and death duties take £133 millions from the £200 millions of income in the over £10,000 per annum class, and a total of about £265 millions from the £500-550 millions of income assessed to surtax. It is obvious that this scale of taxation must not only obstruct the accumulation of large fortunes, but also lead to a considerable dis-saving which has been offset by growing accumulations in the lower ranges.

The bulk of the brief analysis which follows is concerned with the structural changes arising from this diffusion of ownership. It is now, unfortunately, quite impossible to assume, as Professor Clay was able to assume in relation to the 1920-1 figures, that the whole of the "working class savings," represented by Savings Bank deposits, Friendly Societies, the shares and deposits of Building Societies and the like are entirely in the ownership of the under-£100 class. The growth in Post Office Savings Bank deposits in England and Wales has been accompanied by an increase in the average amount due per depositor from £25 1s. 2d. in 1921 to £44 7s. 6d. in 1937,

while the average in the Trustee Savings Banks has risen from £30 os. 5*l.* to £50 6*s.* 11*d.* It would seem scarcely possible, in the light of these figures, to assume that there is no overlap between these savings and the estates of over £100 coming within the purview of the Inland Revenue statistics for Estate Duty purposes. The reverse argument, however, is probably true, that the bulk of the under-£100 estates, in so far as they are not represented by personal effects and household goods, consist mainly of promptly reclaimable deposits of cash.

The deficiency, for present purposes, of the statistics of small savings throws us back on the Estate Duty returns for analysis of the size and content of estates and, though this is admittedly an incomplete guide, it contains a number of suggestive indications. The first problem is to ascertain the typical size of estates, the figures needed relating not to the array of estates by size but to the array of value units against the size of the estates in which they occur, the object being to ascertain the proportion of the total capital passing in estates above or below a certain size. These figures are easily ascertainable from the reports of the Commissioners of Inland Revenue, and a side-by-side comparison discloses, as would be expected, a persistent tendency for the net total to grow larger and for the individual estates to grow smaller. Over short periods the location of the medians and quartiles is affected by fluctuations in Stock Exchange prices and also by irregularities in the numbers of very large estates passing each year, the latter defect being inevitable because the number of deaths of millionaires in a single year is too small to constitute a satisfactory sample.

Over a period, however, these deficiencies tend to disappear, and the changes seem remarkably consistent. The median value rose in 1922-3, when the figures for the first time exclude the Irish returns, to a figure rather over £30,000, but two years later it receded into the £25,000-£30,000 class. This class remained normal for seven years, apart from a fresh rise above £30,000 in the boom of 1928-9; but in 1931-2 it went below £25,000 and has remained below that figure and above £20,000 in every year until 1937-8, except for a rise slightly above £25,000 in the two years 1935-6 and 1936-7. The upper quartile was at £150,000 in 1922-3, slightly higher in 1928-9, and as low as about £86,000 in 1931-2. Apart from these abnormal years, the upper quartile has been consistently in the £100,000-£150,000 class, but there has been a definite tendency for its position to be nearer the lower than the upper limit of the group. Similar, though less noticeable movements have characterized the lower quartile, which has been consistently in the £5,000-£10,000 class except in 1931-2 when it was slightly below £5,000.

I have given these particulars in abstract, since there seems to be no useful purpose to be served by accurate location of the quartiles, but I have chosen four years for the purpose of this comparison, and Table I shows the approximate median and the upper and lower

TABLE I.

Distribution of Property Passing at Death.

(Net Values of Estates dividing the total property passing in estates of over £100 net value at the Median and Quartiles.)

	Q1	M	Q3
1925-6	£6,610	£27,100	£127,500
1928-9	7,150	32,000	155,700
1933-4	6,000	24,720	124,700
1936-7	6,350	25,640	100,500

quartiles as determined by simple linear interpolation. The years chosen include the boom years 1928-9 and 1936-7 and two other years—1925-6 and 1933-4—chosen as being conveniently spaced out for the purpose of this comparison and for the purposes of the subsequent analysis.

These figures readily suggest the groups into which the content of the estates should be classified. I hope I need make no excuse for having shirked the labour of interpolation in the different classes of assets, which would have been required for an analysis strictly divided at the quartiles. I have, however, divided the data into four groups approximately corresponding with these divisions as follows:—

Group I.	Estates of over	£100 but not exceeding	£5,000 net value.
Group II.	„	£5,000	„ „ £25,000
Group III.	„	£25,000	„ „ £100,000
Group IV.	„	£100,000 net value.	

The figures show the gross amount of various classes of asset, and also the deductions allowed in arriving at the net values. I have not set out the full detail of the classification, but have added into the residual item the various classes which do not appear significant in the present discussion. The results of this classification are shown in Table II for the four years concerned.

The analysis is, of course, consistent with the accepted concept, already confirmed by the progressive lowering of the Medians and Upper Quartiles, of large estates being broken up through death duties and of the consequent dis-saving being offset by a corresponding accumulation of small fortunes. It does not appear easy to tell precisely at what point in the scale the normal dis-saving exceeds the amount of saving; but, from the standpoint of the capital market the dissipation may be taken as beginning at the point at

TABLE II.
Composition of Estates of Different Sizes.
(Estates Passing at Death in £ Millions.)

	Group I (£100-£25,000 net)					Group II (£25,000-£25,000 net)				
	1925-26	1928-29	1933-34	1936-37		1925-26	1928-29	1933-34	1936-37	
Cash ...	14.68	17.31	21.11	24.59		8.17	8.97	11.01	12.98	
Policies of Insurance ...	6.69	8.06	10.02	11.50		4.08	4.39	5.39	5.65	
British Government Securities ...	15.03	17.36	19.42	21.51		17.63	19.41	21.66	25.42	
British Municipal and Dominion and Foreign Government and Municipal Securities ...	5.03	5.04	4.71	3.55		11.91	12.50	14.78	13.86	
Stock, Shares, Debentures, etc. of Joint Stock, etc. Companies ...	15.45	16.00	15.92	15.24		39.70	44.10	45.82	58.04	
House Property and Business Premises ...	29.00	29.29	35.57	38.49		21.09	20.22	22.34	23.87	
Land ...	3.45	3.24	3.08	3.77		3.85	3.85	3.63	3.84	
Other Property ...	23.65	27.14	26.89	28.41		25.83	26.57	28.14	30.15	
Gross Total ...	112.98	123.44	136.62	147.06		132.57	140.01	152.77	173.81	
Deductions ...	14.70	13.63	16.80	16.66		9.23	8.76	9.28	10.95	
Net Total ...	98.28	109.81	119.82	130.40		123.34	131.25	143.49	162.86	

	Group III (£25,000-£100,000 net)					Group IV (Over £100,000 net)				
	1925-26	1928-29	1933-34	1936-37		1925-26	1928-29	1933-34	1936-37	
Cash ...	4.73	6.53	6.63	8.33		5.34	7.92	15.12	7.52	
Policies of Insurance ...	2.60	2.93	3.09	3.73		1.93	3.27	2.89	3.22	
British Government Securities ...	15.45	16.23	17.13	21.45		21.15	24.45	25.69	19.54	
British Municipal and Dominion and Foreign Government and Municipal Securities ...	10.10	12.17	15.15	15.34		11.39	13.39	15.08	13.68	
Stock, Shares, Debentures, etc. of Joint Stock, etc. Companies ...	44.82	51.26	46.89	69.89		51.44	73.79	56.98	78.81	
House Property and Business Premises ...	11.83	12.23	11.36	12.53		11.15	5.68	7.37	6.24	
Land ...	4.48	2.37	3.65	3.32		11.85	12.32	7.20	6.17	
Other Property ...	20.26	24.01	18.90	21.67		20.98	32.26	19.46	25.38	
Gross Total ...	114.27	127.73	122.80	156.87		135.70	172.61	149.69	160.56	
Deductions ...	6.35	5.86	5.76	6.56		8.85	10.41	6.06	12.17	
Net Total ...	107.92	121.87	117.04	150.31		126.85	162.20	143.64	148.39	

which the liabilities of estates exceed the amount of assets which are left in a liquid condition or which become liquid at death. This is the point above which the ownership of capital assets, or of claims against assets or against communities, have to be sold to meet the liabilities of estates.

This, again, cannot be determined with precision, since this would involve taking account not only of the size of estates but also of the manner of their disposition. A rough guide can, however, be obtained by a comparison with the stated liabilities and the assets of undoubted liquidity. On the liabilities side we must take account both of the liability to death duties and of the financial obligations left by decedents. The latter is measured by the "Deductions" allowed from the gross valuations in arriving at the net. These deductions are shown in the separate size-classes, but their distribution among the different types of obligation is shown only in respect of the total figure. In 1936-7 the position thus revealed for Great Britain was as follows:—

Gross Total		£638,304,107
<i>Less Deductions —</i>		
Debts owing to Persons resident in Gt.		
Britain	£24,945,225	
Funeral Expenses	2,560,000	
Other Deductions from Personalty	4,071,278	
Mortgages	13,818,901	
Other Deductions from Realty	944,052	
		£46,339,456
Net Total		£591,964,651

It is, of course, by no means clear that the whole of these obligations, and particularly those allowed against real estate, are immediately payable on death, but the assumption that the whole is so payable is necessary if the assets and liabilities are to be compared. In all probability the error introduced by this assumption is no larger than the error in the opposite sense introduced by ignoring the influence of specific legacies. On the assets side the liquid assets are taken as being the cash and the policies of insurance, but this somewhat overstates the total since the policies include those taken out on the lives of other persons. Since, however, the majority of such policies can be converted into cash at their surrender value, the error thus arising is probably small.

On this basis the further analysis of the figures for the four years under discussion showed a slight surplus of liquid assets in the £5,000—£10,000 class of estates except in the year 1925-6, when there was a slight deficiency. Above this range there is a deficiency throughout. It is possible that the item "Money lent on Mortgages, Bonds,

Bills, etc." ought also to be included among the liquid assets; and, if this were included in its entirety the lowest class to be unbalanced would be the £30,000-£40,000 range in 1937-8 and the £40,000-£50,000 range in the earlier years. It is, however, very uncertain to what extent this asset is capable of immediate conversion into cash on the death of the estate-owner concerned. Of the total, amounting to nearly £52 millions in 1936-7, only some £6 millions was represented by ordinary debts due to the deceased, rather over £15 millions was money lent out on mortgage, and the biggest item amounting to £30·7 millions was lent on bonds, bills, notes and other securities. An item of this character obviously covers many various degrees of liquidity.

It must be emphasized that, in so far as this analysis treats of capital payments to the Exchequer, it deals only with Estate Duty and does not cover the dissipation of capital ownership through Legacy and Succession Duties. The data, so far as they go, suffice however, to allow us to affix labels to the four groups into which the estates have been divided in Table II. Group I, which corresponds exactly with the Colwyn Committee's definition of small savings, is definitely the saving group; Group II is intermediate, with saving in progress at the lower end and probably some slight dis-saving at the higher; and the two remaining groups fall definitely into the dis-saving category.

A comparison of the figures shown in Table II yields a number of points worthy of particular comment. The increase in liquidity is common to all groups, but in all except the first it is no more than was to be expected in the light of the increase in capital values as a whole. On the other hand, in the first group the aggregate increase has been characterized by a large increase in liquidity, in house-ownership and to a lesser extent in securities to be classified as "claims" (*i.e.* British and Foreign Government, Corporation and Municipal stocks), at the expense of any growth in the ownership of industry as exemplified by the proprietary shares in Joint-Stock Companies. It will be necessary to recur to this point at a later stage.

It is possible from Table II to trace a tendency towards a changing structure of ownership which does not depend upon Trade Cycle or Stock Exchange fluctuations. In Table III these tendencies are further emphasized on the basis of a direct comparison between 1925-6 and 1936-7. In compiling this table the residual item of Table II has been partly re-allocated, and the data have been re-arranged under different headings as follows: -

Liquid Assets. This includes cash and policies of insurance.

Claims. In the first instance this covers claims against communities, in the form of the securities issued by the British, Dominion,

Colonial and Foreign Governments, and Local Government bodies. In addition it includes, from the residual item in Table II, the money lent out on mortgage, on bonds, bills, notes and other securities, and debts due to decedents.

Land and Houses. This includes business premises, which are not shown separately as well as domestic house property, and land held on freehold, copyhold and leasehold tenure.

Ownership of Industry. This item covers a rather wider field than its description implies. It includes debentures which, if classified separately, would rank as claims, and it includes proprietary and debenture interests in companies incorporated overseas. All but about £2 millions of the increase, however, relates to companies of British incorporation. It also includes (from the residual item in Table II) the amount of trade assets, which comprises partnership property, plant, patent rights, stock, book debts, ships and goodwill.

Miscellaneous. All other estate items are included in this category, the chief classes being household goods, ground rents and expectant interests.

TABLE III.

Apparent Changes in Structure of Property Ownership
(1936-7 compared with 1925 6)

(£ millions.)

	Group I (Estates £100 £5,000 net)	Group II (Estates £5,000 £25,000 net)	Group III (Estates £25,000 £100,000 net)	Group IV (Estates over £100,000 net)
Liquid Assets	+ 14.72	+ 6.38	+ 4.73	+ 3.47
Claims	+ 10.88	+ 14.99	+ 14.58	— 0.08
Houses and Land Ownership of Indus- try, etc.	+ 9.81	+ 2.46	+ 0.15	— 10.06
Miscellaneous	— 0.78	+ 17.84	+ 24.13	+ 32.38
	-- 0.55	— 0.43	-- 0.99	+ 0.15
Gross Total	+ 34.08	+ 41.24	+ 42.60	+ 25.86
Deductions	+ 1.96	+ 1.72	+ 0.21	+ 3.32
Net Total	+ 32.12	+ 39.52	+ 42.39	+ 22.54

It should be remarked that the growth of industrial ownership in Group IV was inflated by the inclusion in the 1936-7 returns of a single very large estate which brought in an exceptionally large holding of trade assets. For this reason Table III overstates the growth in this section by an amount which may be tentatively estimated at about £5 millions. The growth is nevertheless large, and the general conclusions are not affected.

The changes shown in this table are, in my submission, of very considerable social importance. I have already stated reasons for

believing that Group I is the only effective saving group; and this group, apart from house ownership, does not invest its savings. In consequence the market for investment, that is to say for the financing of industry's capital requirements, is left almost entirely to the investment intermediaries and to the larger capitalists whose estates undergo a process of disintegration whenever they pass through the Estate Duty statistics.

My impression, and for this I can adduce no statistical proof, is that this understates the true position in relation to industrial ownership. If Death Duties were the only impost to which the large estates were subjected, the dissipation of estates at death would not necessarily be harmful so long as the aggregate savings of the community were sufficient to offset the dis-saving. The distribution of financial savings does not imply the destruction of capital assets, whatever reaction it may induce on the prices of capital goods. On the other hand, the mode of supply of new capital assets is largely pre-determined by the channels of its financing, and this raises a social question of some potential importance. The crux of it may be expressed in a single sentence; the savers of money do not invest and the investors of it do not save. In this connection I have used the word "invest" as meaning the use of financial resources for the financing of investment in the stricter sense, the acquisition of productive equipment, and the supply of working capital.

This brings the discussion into the ground covered by Mr. Colin Clark in Chapter VIII of the *National Income and Outlay*. In his analysis he found that the savings "for security" from the smaller ranges of income, combined with the undistributed profits of industry and the sinking funds of local authorities, was sufficient to account for the whole of the accumulation of capital assets. He concludes that private individuals meaning, apparently, those in the higher income-ranges — "are probably still on balance spending from their capital, or spending the proceeds of capital appreciation of securities which is equivalent to spending capital from the social, if not the individual point of view."

This tallies very closely with such social observation as is available to the majority of practitioners in the capital market. So far as concerns the large-scale private capitalist, the normal criteria of the capital market have virtually ceased to exist, and in the finding of outlets for money the concept of potential appreciation is seldom absent. In other words the large capitalist is a speculator for two reasons. In the first place, he (regarded collectively) sells each year more securities for Death Duty purposes than he buys from current savings; and secondly he normally expects to sell securities at a profit for surtax purposes, and often for living expenses as well.

The latter applies with particular force to capitalists in the middle ranges, many of whom receive substantial earned incomes and thus incur a heavy liability for income tax and surtax neither of which is deducted at the source, and which therefore tend to create a strong incentive to speculation. In fact the practice of "making the overdraft pay" is a social institution which cannot be disregarded. In essence it implies the borrowing, through indirect channels, of the security savings of the lower income-ranges, and their application in the quest for capital profit.

This applies not only to the Group I capital funds which are left in the form of cash, but also to the bulk of those which are applied in the purchase of claims. Money deposited with a savings bank is in effect investment through an intermediary, as also is the payment of a life assurance premium. Money spent on the direct purchase of a claim is equivalent to leaving to the seller the task of finding an investment outlet for the money. In neither case are the funds directly applied in the acquisition of a capital asset and seldom enough in the financing of such an acquisition.

Legislation has not, up to the present, attempted to deal with the social problem thus arising. The effective markets for the ownership of industry are the Stock Exchanges, and the Chairman of the London Stock Exchange has lately admitted in a broadcast address that it is the small saver who ultimately determines prices and the terms of financing. I am not clear that the small man's money has in effect any dominant influence in settling the prices of proprietary shares, and indeed the figures in Table II suggest that his interest in this section is small and tending to decrease. The fact remains that the Stock Exchange machinery of the country is organized almost entirely for the benefit of the larger capitalist. This fact, in present conditions, is likely to persist since the large capitalist has a large turnover and, even if he withdraws on balance more money than he brings to the market, his business is worth while to a community which is remunerated in proportion to turnover. This fact is noticeable in many ways, particularly in regard to the trouble taken in economic research and other service given by brokers to their clients.

These remarks are not intended to be critical of the work done by the Stock Exchanges, which undoubtedly fulfil a very useful function in relation to the present machinery. On the other hand, it is possible to criticize the general machinery of which these bodies are a part; and it is no part of the Stock Exchanges' function to be cognizant of the broader issues under this head. The markets are organized to cover the needs of their best customers; and, if these needs are of a speculative character the fault lies with external circumstances rather than with the markets themselves.

It is, however, desirable to make some analysis of the wastes involved, and necessarily involved in present circumstances, by the organization as it now exists. In the first place, the necessarily speculative attitude of the larger capitalists increases the predisposition of market prices to fluctuate unduly. Theoretical explanations have been adduced for supposing that the increasingly capitalistic character of modern industrial enterprise must, if left to itself, enhance the amplitude of fluctuation between the prosperity of booms and the poverty of depressions. So far as the market in industrial capital is concerned, it would seem that this amplitude is also enhanced by the technical factors which have emerged from the present analysis, since the speculative tendency among the larger capitalists means an over-disposition to buy and thus to inflate prices when economic conditions are good, and the deflationary tendency associated with an absence of buyers when prospects are considered less good. The effects of this on the country's economic life may be very considerable, since the market valuation of the securities quoted on the Stock Exchange represents a high proportion of the aggregate value of the country's capital. Mr. Campion estimates, in relation to the period 1932-4, that the value of privately owned property was £22,670 \pm 1,860 millions and property in public ownership as £2,890 \pm 435 millions. The market value of Stock Exchange Securities has been computed by the Committee for General Purposes of the London Stock Exchange at approximately £19½ millions in March, 1937 and £17¼ millions a year later. This aspect of the problem was discussed, in relation to parallel experience in the United States of America, by Lord Stamp in his Finlay Memorial Lecture delivered in Dublin last October. There can be no doubt that excessive fluctuations in the value of capital claims, and in this sense all negotiable securities must be included, have a very marked effect upon the demand for the produce of industry and a number of industries such, for example, as the motor industry - are catalogued as being "sensitive to Stock Market fluctuations." Deflationary influences of this type, once set in motion, have a way of becoming cumulative; and it is therefore possible that the organization of the capital market, since its speculative tendency enhances fluctuations in prices, has a definite effect in exacerbating the unhealthiness of industrial booms and the poverty of the ensuing depressions.

Another, and equally serious, cause of waste is the diversion into uneconomic use of resources which might be more effectively put to other uses. This happens in two principal manners, first by the over-expansion of genuinely productive plant under the stimulus of the prevailing optimism, and secondly by the promotion of companies

either for purposes of little economic usefulness or in the financing of which the amount paid for vendor's consideration bears scant relation to the value of the assets. Much has been done in recent years, both by legislation and by the Stock Exchange Committee, to suppress the worst abuses capable of arising under this head, such rules as the disclosure of consideration paid for goodwill and the tentative discouragement of holding company finance being designed to act as at least a partial stabilizer. It is too early to attempt a statistical comparison of survivals from the boom flotations of 1935-7 with those of 1928-9, but there would seem to be ground for believing that the control of such issues is considerably more effective than was the case ten years ago. Nevertheless, in the present form of organization, it would seem to be almost impossible to stop wasteful offerings of stock in periods of optimism. In this connection it is worth noting that asset-valuations included in prospectuses are prepared by reputable valuers, but are often paid for on the basis of a proportion of the proceeds of the issue. The temptation to allow the valuation to be biased towards whatever figure the market will stand is too obvious to need emphasis and cannot be wholly excluded. Moreover, it is no part of a valuer's job to estimate the usefulness of physical assets; and there is therefore likely to be a very real difficulty in preventing savings from being either wasted through the acquisition of capital assets which are not necessary to the country's economy - or dissipated through the paying of excessive prices for assets and thus allowing a part, often a very large part, of the capital subscribed to be taken in as profit at some stage of the process of flotation. These are the real wastes of allowing a speculative condition to develop in the new issue market, and it is difficult to see how they can be avoided in view of the strong incentive which exists for the development of an underlying speculative position in the stock market.

A third aspect of this wastefulness is the premium which the structure of saving sets upon the promotion of unsound finance. We have seen that the effective savings of the country are accumulated by small capitalists who are predisposed to keep them in liquid form or to entrust them to intermediaries; and it is noteworthy that these intermediaries are, by their very nature, themselves predisposed to use their funds in the purchase of claims. This applies even to the insurance companies, which carry by far the greater part of their funds in fixed-interest or fixed-dividend securities, even though a small part is invested in ordinary stocks and shares. This tends to create a good market for claims, but to relegate to the attention of the speculator the offerings of ordinary shares. On the other hand, the main need for industry to-day is for the subscription of capital

funds in effective risk-bearing form, that is to say in the form of ordinary shares. The main justification for this statement is the examination of industrial profits prepared by Dr. W. H. Coates for the Balfour Committee, from which the conclusion emerged that "average profits" did not compare unfavourably with the pre-war level, but that the dispersion was considerably greater, "increased gains at one end of the scale balancing against increased losses at the other." Dr. Coates' analysis relates to 1922-3, and I do not know of any repetition of it in more recent years; but it is my belief, and I am glad to note an apparent agreement in Mr. A. T. K. Grant's *Study of the Capital Market in Post-War Britain*, that the dispersion in question is still an important factor. It is a natural phenomenon to expect in a period during which industry is endeavouring to establish for itself the increased productivity which is the only ultimate remedy for the budgetary legacies of the war, and which involves dependence upon varying estimates of human tastes and the rapidity with which they change.

There is thus a divergence of interest between the accumulation of savings and industry which uses them. The owners of savings require claims; and industry, which would be better off with ordinary capital, finds itself in a position in which money can be more easily raised by the issue of obligations or of preference capital. This misfortune has been accentuated, and converted into a positive temptation, by the continuation of a cheap money policy. The influence of an excess of this type of issue has been emphasized particularly by Mr. E. H. Lever in a paper published in the *Journal of the Institute of Actuaries* (Vol. LXIX, Part 1, No. 324, 1938). In the course of his analysis Mr. Lever remarks that it is "only the exceptional type of business venture which really justifies the raising of capital in fixed-interest form to any large extent," and proceeds to argue that the fluctuating character of profits should be more adequately reflected in the form in which capital is raised.

It does not need much argument to indicate the damage done by an excessive rigidity in the terms on which capital funds are raised in a business with fluctuating profits. The fluctuations often occur in industries in which they were least expected when the obligations were created; the experience of railway companies in this country and elsewhere is a standing example of this. From the capitalist's standpoint the effective security for a debenture is not the replacement cost of the assets pledged, but the earning capacity associated with them. The creation of a rigidly fixed charge, and subsequent difficulty in meeting it, often confronts boards of directors with the necessity for choosing between refusing the payment and thus creating heavier obligations for the future, and meeting the pay-

ment at the expense of the provision which would otherwise be made for the depreciation and obsolescence of their fixed assets which implies a harmful form of dis-saving.

The unfortunate feature of the market for new issues of ordinary capital is its dependence on the speculatively minded class of capitalist and thus upon the apparent offer of speculative opportunities. In present market conditions it is rather exceptional for ordinary shares to be successfully marketed unless they offer the subscriber "something to go for," and the basic investment merit of the offer is only a secondary consideration. The effect is that, unless conditions are good enough to promote optimism, industry tends to be starved of ordinary capital in times of depression when enterprise is most to be desired. Established concerns are, of course, able to arrange temporary finance through their bankers and await a suitable opportunity for making their appeal to the capital market. On the other hand, the financial opportunities open to new and small enterprises are somewhat deficient and notoriously expensive; and thus, though savings in the Group I range normally accumulate even in times of depression, industry passes through a phase when useful expansion is unduly hampered.

I do not think that I have exaggerated the importance of speculative business in the stock markets, but I would hasten to add that the business to which I refer is not wholly or even mainly conducted by the use of *contango* facilities. A substantial portion is financed by bank loans for account of the individual capitalists, and a still larger proportion by loans from brokers which, though they are largely granted from money borrowed from the banks, do not appear in the clearing banks' advances since the loans are granted to brokers on "short notice" terms. Moreover a purchaser is not necessarily non-speculative if his stocks are paid for with his own money, since the bulk of private "investing" is now done with a view to ultimate re-sale at a profit.

I have endeavoured to show that the structure in its present form is socially unsatisfactory, since it creates undue difficulty in supplying industry with the type of capital funds which it most requires at the times when the need is greatest, and because it too frequently favours the uneconomic application of capital resources. The basic reason for this is evidently the separation between the saving class and the investing class, and unfortunately it seems that the Unit Trust movement has not been altogether successful in bridging the gap as it was at one time hoped that it would. The main reason for this is the expense of handling very small accounts, each of which has to receive a dividend twice a year, which has led the Unit Trust managers to concentrate much of their effort on getting

the larger subscriptions. An analysis of Unit Trust holdings prepared by the *Economist* from confidential information and published during 1938, shows the typical sizes of holdings to be singularly similar to the typical sizes of industrial investment disclosed by Mr. Hargreaves Parkinson's analysis in "*Scientific Investment*." The inference is that the Unit Trusts have contributed little towards making available for industry, through the stock market, funds which would not otherwise have been in the market, even though their average customer is less large and, necessarily, less speculative than the capitalist for whom the Stock Exchanges chiefly cater. The early auspices of the Unit Trust movement were unexceptionable, but the expenses incidental to sales, publicity and the remittance of dividends were altogether too high to enable the Trusts to deal profitably with subscriptions on the really small scale which it would be desirable to attract. Moreover, the stimulus of competition led to the practice of levying charges in ways not revealed in the preliminary advertising and, though the drawing of exorbitant profits may have been the exception rather than the rule, the aggregate charge to subscribers has in some cases been as high as twenty per cent. It is difficult to resist the conclusion that the effectiveness of the service to the private capitalist has suffered from the diversion of funds into competitive publicity, at the expense of the functions of management and supervision. It is, of course, possible that the movement may be directed into more useful channels as a result of legislation recently enacted.

The shortcomings of market structure in relation to the supply of capital funds can presumably be held to account for the slowness of the country's industrial capital formation. I here fall back again on Mr. Colin Clark's analysis of savings and investment, the acceptance of which involves the acceptance of a good deal of rather hypothetical inference which serves to emphasize the unfortunate shortcomings of the statistical material available for any comprehensive study of the capital market. I am inclined, however, to question Mr. Clark's inclusion among savings of amounts written off inventories, and also the necessity for the footnote to Table 87 in the *National Income and Outlay* in which the expense of property transfers ("probably treated as capital outlay in most cases") is noted as helping to account for the discrepancy between the figures for total savings and the total of investment-cum-trading losses. The amount written off inventories should, in my submission, be treated as largely if not wholly a self-compensating item, being balanced on the other side of the ledger by the incurring of a loss (or, which is the same thing, by the non-recording of a profit), or alternatively resulting in a dis-saving manifesting itself in the writing down of issued capital.

Certainly Mr. Clark's figures make better sense if this item is omitted, since they show investment totals consistently in excess of the ascertained savings (*i.e.* undistributed profits, state and local authority sinking funds and the security savings of the working and middle classes) up to and including 1929, and thereafter a consistent excess of the same classes of savings over the amount of investment. This is consistent with Mr. Clark's argument that "private saving has not recovered to the modest level which it occupied in the years prior to 1929," and also with the present argument that the increasing tendency towards reliance on speculative attractions is inimical to industrial capital formation.

The growth of industrial and commercial capital, as shown by Table 88 of Mr. Clark's analysis, certainly appears to have been unduly tardy; and it must be conceded that the cheap-money policy of the middle 'thirties can only be judged a success in so far as the new money created was translated into savings which, in their turn, were translated into tangible capital assets. Mr. Clark's analysis suggests, rather forcibly, that the success of the present organization is limited chiefly to house property and the type of asset secured by the finance of public authorities, and that its service to industry is scarcely comparable with the industrial expansion to which the nation looks forward. Precisely similar results are suggested by the rather scanty survey of ownership which has been possible this evening.

It is possible that the Unit Trust movement, if it be assumed that the newly imposed control is successful, will achieve the improvement of its service and the lowering of its charges which will enable it to fulfil the social function for which it seems to be intended. Such investigation as has yet been made possible, and the data are very scanty, is quoted by the *Economist* as suggesting £10,000 as being a typical size of estates in which sub-units are held. This fixes the Unit Trusts as catering mainly for Group II, the intermediate group, and some reconstruction will be needed before they can economically cope with subscriptions of the order of magnitude which are likely when they concern themselves seriously with Group I. Fortunately the savings in this class are mainly intended for security rather than for an income to be drawn immediately, and this circumstance would favour the organization of the movement on the savings-bank pattern, with dividends paid by ledger entry rather than by warrant. It will, however, be agreed that a movement of this type would need even stricter control than has yet been imposed on the Unit Trusts, and many observers of the movement would prefer that it should be under official, or at least semi-official auspices.

It is possible, indeed, that an effective scheme of control for the

investment-outlet of the savings which are really effective would be a desirable alternative to any more closely organized control of industrial enterprise. On the other hand, I hope I have taken this analysis far enough to justify the assertion that the present organization needs adjustment. The capital market has witnessed in recent years the vicissitudes attendant upon at least one capital enterprise of national importance, which came to grief largely because it had been put in hand at a time when the financial opportunity was better than the industrial opportunity, and which was only salvaged by the regimentation of savings through the banking system. It is open to question whether the conditions upon which the help was granted—conditions imposed by the dictates of banking prudence, which appear likely to be standardized—are altogether conducive to the free exercise of industrial initiative. For this reason I doubt whether the problem can be effectively solved through the banking system; and it is worthy of note that the principles which I have described are not capable of indefinite extension without prejudice to the non-industrial character of British banking.

I do not wish to prolong my opening of this discussion to include an analysis of possible remedies; indeed, I can hardly consider this brief analysis to have established beyond doubt the existence and character of the problem. If, however, the conclusions suggested should prove correct, there can be no doubt that the problem of adjustment needs rather urgent attention. Subject to this correctness, it would seem certain that a cheap-money policy is less industrially beneficial than it might be, or have been, with a more effective capital organization. Subject to the same proviso, it may be necessary to enquire whether the market quotability of securities and their transferability through sale and purchase is in all circumstances the best method of industrial finance; and whether the more adventurous instincts, which this type of finance must inevitably encourage in the present structure of savings, might not find a more useful outlet in other directions.

It is not improbable that a solution to the apparent problem might be found through the insurance companies; and in this I must join issue with Mr. Grant in his statement that private holders of stocks and shares are more important than the investment intermediaries (including the insurance companies). He admits the importance of the intermediaries to be growing rapidly, but he scarcely takes account of the disproportionately large growth in insurance policies passing at death in estates in Group I, which is the effective source of real saving; and it must be remembered that these figures themselves are probably a great under-statement, in view of the large amount of life assurance in this group which is protected by the Married Women's Property

Act and does not enter into the statistics at all. The actual, and still more the potential, importance of insurance companies as sources of new capital funds can scarcely be over-emphasized, and large parts of the money deposited with them normally become available as capital funds for industry.

Even in this respect, however, the system is far from the industrial ideal, and the fault (if my reasoning is admitted) lies with the convention which presupposes an assumed rate of interest and thus submits life assurance to the dictates of the philosophy of the fixed charge. Mr. Lever, in the work which I have quoted, goes so far as to suggest—with an admission of the startling character of the proposal— that life assurance tariff rates should be the pure premiums at rate of interest zero “ to be adopted by all companies who would then vie with one another in economy of administration and skill in investment, and compete on the profit-sharing side alone.” This suggestion was developed after a strong case had been made out against non-profit policies; and it is, indeed, possible to envisage a system in which the bulk of the nation’s effective savings would seek investment through insurance companies doing entirely a with-profit business based on zero interest. Insurance business of this type would presumably be freed from the rather undue addiction to fixed-interest stocks which characterizes the companies as at present organized. Even in such a system, however, it is interesting to speculate whether the best results would be obtained by new capital being furnished, on the present trial-and-error system, through the Stock Exchange; or whether the savings, accumulating in the hands of the insurance companies, might not be more effectively co-ordinated with industrial needs by a Board of Investment.

DISCUSSION ON MR. GORDON’S PAPER

MR. HARTLEY WITHERS said that Mr. Gordon had raised a question which was certainly very interesting, but he had done it rather by an effort of imagination than by strict statistical method. He gathered that what he thought was wrong about the capital market was that the savers did not invest and the investors did not save. It was rather difficult to know exactly what he meant by “invest.” In one passage he seemed to refer to buying houses, building factories, and supplying equipment; in another he seemed to mean that saving was carried out by buying debentures and claims and, he understood, preference shares. Apparently, if one bought fixed interest securities one was not an investor, but if one bought ordinary shares, one was. It was very important when discussing these things which had a serious social bearing to make it clear exactly what was meant.

As far as he could see, the only question of practical importance to the capital market was whether the industry of the country could obtain all the capital it wanted. That it could obtain any amount in the form of fixed interest securities was quite undeniable, although some theorists on these points did not seem to follow the market sufficiently closely to understand this fact. For some time the Stock Exchange had been so dead and the financial pundits had been advising so strongly on the side of "liquidity" that any amount of money was stacked up waiting for an early opportunity. However, let it be supposed to be true that savers did not invest and investors did not save. Did that matter as long as industry could get what money it wanted in one form or another? It certainly could get as much as it wanted in the form of fixed interest securities or of its own cash. It was able to provide this out of its own profits, and this it did to a continually increasing extent, especially in times like the present, when everybody was afraid of Hitler, afraid of taxation and afraid of the trade cycle. This passion for liquidity was almost a disease. If the *Economist's* figure of industrial profits were taken, it would be seen that larger and larger amounts were put away to reserves openly, and everybody knew that the sums put away in hidden reserves were growing at least *pari passu*.

It was recently stated by Mr. Keynes in a letter to *The Times* that the whole amount of capital required by industry under present conditions was probably being furnished by its own accumulations. If that was so, and industrial concerns were able to finance themselves from their own accumulations, and could get almost any amount they wanted against fixed interest securities, he could not see that industry had much to complain of concerning the state of the capital market. Industry put away so much year by year that every now and then it had to make a distribution of bonus shares: in other words, it made the shareholders subscribe to its new shares year by year, and that was how it got the equity capital it wanted.

There was a difficulty, of course, when a new company came along and wanted to issue shares to the public. Mr. Gordon seemed to think that it was a great pity that this kind of issue should be left to speculators or speculative investors. But surely that was just as it should be. It would be a very serious thing if the small saver were to risk his money on novelties of this kind. No new company that ever came out was the kind of thing in which a small investor had any right to risk his money. It had always to make good, probably to test its management, and find its markets, and so forth. It was surely right that that kind of issue should be left to the people who were out for speculative profits, and he thought it was rather unfair of Mr. Gordon to say that "something to go for" was all that was wanted and that investment merit was ignored. Could one have "something to go for" unless there was real investment merit behind? And if so, were people like Mr. Gordon, who taught the public how to invest, doing their job?

The point on which he really thought that Mr. Gordon might have made himself clearer and fairer was concerning Unit Trusts. He said that they had unfortunately failed to fill the gap between

the saver and the investor. That might be true, though the speaker's experience as a Unit Trust manager was that they had a very large number of unit holders who were quite small investors, and therefore, he thought, really savers. But he wanted to ask Mr. Gordon how he thought the Unit Trust movement could do the really useful work which in his opinion it might do if it was continually subject to the sort of insinuation conveyed in the present paper. Mr. Gordon had to a certain extent already modified his strictures, perhaps owing to some remarks which he had made to him before the meeting, but still he stated that the Unit Trusts' aggregate charge to subscribers had been in some cases as high as 20 per cent. It was most important in these matters to be quite certain that one was making one's meaning clear. Of course, Mr. Gordon knew perfectly well that the charge made to buyers of Unit Trust units included not only the profits of the managers but the fees of the trustees, the cost of advertising, the brokerages involved, the stamp duty, and the jobbers' charges. When all these things had been taken out, the actual average profit to the Unit Trust manager was probably about 1 per cent. Mr. Gordon had said that the movement could not maintain itself. As a matter of fact, the *Economist* Supplement just published had shown that the Unit Trusts had sold in this last year of extreme depression when many stockbrokers were not paying their office rents—some six millions net, which had been added to the amount of public money put into the Stock Exchange, so giving a most valuable support to the stock markets at a time of acute depression and a time when, for international political reasons, it was most desirable that London should show a firm front.

He agreed that the state of the capital market, if judged by the London stock markets, had presented a pitiable appearance during the last year, with "jitterbugs" very much in evidence. The statisticians themselves were largely responsible, having invented this delusion about a trade cycle, with the result that whenever the markets were good, people began to think that there was a depression round the corner, and industry had got a still worse delusion, which made it think that the stock markets were a trustworthy barometer of the industrial future. The absurdity of this was shown by the great stock-market boom in America, which ought to have heralded the greatest expansion of trade that had ever happened, and was in fact the precursor of one of the worst depressions.

MR. HAWTREY said that this was a stimulating paper on a subject which deserved exploration. Everyone would probably agree with the position the author set out to demonstrate in the early part of his paper, that the effect of high direct taxation, and particularly death duties, was to encroach very seriously on the available fund of savings. He did not feel very much confidence in the ingenious method Mr. Gordon suggested for measuring the extent of this encroachment. He did not think one could take the relation between the liquid portion of the assets left at death and the liabilities as any test at all of the extent of dis-saving involved. It would be necessary to estimate what the deceased would have done throughout his

business life if he had not been subject to these taxes. It was quite likely that the prospect of the taxes was frequently an actual stimulus to saving, and though in cases of the highest incomes and the highest fortunes it was probably impossible for the rich man to save as much as he would have done if he had not been taxed, still the extent to which high direct taxation encroached on saving was a good deal less than the actual burden of the taxes—how much less he could see no way of estimating. Still it could probably be taken as common ground that encroachment on saving was in the end very considerable.

In the second part of his paper Mr. Gordon drew inferences from this conclusion. He did not think that he gave quite an accurate picture of the proceedings of the wealthy taxpayer. Such taxpayers could be divided into two important classes, among others. There was the business man who was making his income out of profit—industry, finance, merchandise, whatever it might be and was “making money.” So long as he was doing that, although no doubt he paid super tax on his profits, he did save a considerable proportion. Possibly it might be three-quarters of what he made, since such an income was large in proportion to his capital, and was especially varying and precarious. His savings probably went into fixed interest or gilt-edged securities, or at any rate securities of an investment kind. Then he retired from active business, and his fortune consisted of these accumulations of investment securities. When he died, this was distributed among his heirs and successors, and a large portion of it was taken in death duties. There was thus a heavy debit to be put against his saving.

Mr. Gordon had suggested that the class of people who suffered this debit against their savings were induced to enter into speculation as a source of income. It was important to distinguish the different kinds of speculation that might be involved. Speculation in the strict sense—short period speculation—might be a source of income to a wealthy man who gave his whole time to it. The stock-jobber himself was in a sense a professional speculator. He had to forestall the views of the market; if he merely followed the market he would very quickly come to grief. He was a professional speculator who made a closer study of the market than anyone else. There were also, of course, professional dealers such as those concerned in investment companies, who gave practically their whole time to studying markets and engaging in short-period speculation with a view to making an income out of it.

On the other hand, there were amateur speculators, who did not give their whole time to it, and who must be regarded as treating it not as a source of income but as a sport—a very expensive one. Mr. Gordon stated that the speculators had an unfortunate effect on markets, because when the prices of securities were low they stopped out of the market and did not buy, and when prices were high they came into the market and made them still higher. That must have a still more unfortunate effect on the speculators' own fortunes.

But that did not exhaust the realm of speculation. He had been speaking of speculation in marketable securities. The kind of speculation that industry required was the speculation of the wealthy

individual who put money into a project that he understood, because he was himself an industrialist or a dealer in merchandise and acquainted with the technicalities of the market he was going to supply. New ventures were not ordinarily floated by public issues on the market, because people could not be induced to put money into them unless they had knowledge of what was proposed. What was commonly called "risk bearing" by economists was not risk bearing at all, it was technical knowledge of the processes of production, knowledge of markets and commodities and of the individuals concerned in the market. The history of the new issue that came on to the market usually was that, years before it did so, a limited number of wealthy men had put moderate sums into the development of some idea or invention or the exploitation of some new market or territory. Such projects had the characteristic that the investing public would not be able to judge their merits correctly until they had already obtained experience of them as a going concern. The financiers and industrialists who started projects of this kind would have to nurse them for a considerable time. Some would, of course, end in failure. But if adequate knowledge and judgment had been shown, the result would be a successful concern. When there was a fair record of realized profits in the past, it was then possible to make a public issue of shares, to take advantage of the growing goodwill, and supply the people who originally floated it with a certain amount of loose cash with which they could either endow their families or float something else.

That was the kind of speculation which was useful in industry and business generally. There was no short cut to it, because it absolutely depended on technical knowledge and experience. The money must be supplied by people who either had the knowledge and experience themselves or were in close touch with technical experts and promoters whom they could really trust and of whose knowledge they had adequate evidence. He did not think that anything which was done to improve the organization of the market would get round that fundamental need of skilled promoters for industry in the early stages, before it ever went on the market at all. Once it did go on the market, he did not believe there was any serious lack of funds.

He would add one further observation. The experience of this country since 1920 had been an experience of unrelenting depression, and therefore the state of the markets during that time had never been really typical. It had never been possible to get really normal healthy experience of business. Most of the hard work put by statisticians and economists into investigating conditions in the past twenty years had been in the nature of a pathological investigation.

MR. J. B. SELWYN said that Mr. Gordon regretted that in present market conditions it was necessary to offer speculative opportunities in order to make a successful issue. The present speaker considered that the unfortunate feature was not the presence of this speculative element, but rather the investor's difficulty of making a true assessment of its value. The promoters of an issue, realizing that they were

competing with other possible channels of investment, had to tempt the subscriber to lend them his funds. They might become over-zealous in their eagerness to get them, and then difficulties arose. The conditions laid down by the Companies Act, 1929, permitted a considerable amount of window-dressing and self-advertisement which was often misleading. Even small things like the use of special type and involved sentences were to an inexperienced person a considerable difficulty. It would assist the small investor if some means were devised to enable him to make a quick objective decision. The leading financial papers did excellent work in analysing issues and cutting away all the trimmings, but it would be extremely useful if some rating system, comparable possibly with Moody's in the United States, were developed here, so that any person could see at a glance the standing of any issue. He would suggest that such factors as the following be taken into account—yield, security of income and capital, term to redemption of fixed interest stocks, any special privileges, such as participating rights, options, and convertibility; also marketability, the history and prospects of the company, market conditions, and the purposes to which the money was to be put. It would be interesting to have all this in a short code.

Furthermore, it would be useful if the conditions relating to the lay-out of prospectuses were amended so as to compel promoters to give the relevant information in tabulated form according to a set schedule.

Mr. Gordon further said that the financial opportunities open to new and small enterprises were somewhat deficient and notoriously expensive. He thoroughly agreed. Take as an illustration a small man running an established business who wished to borrow, say, £50,000, and suppose for the moment that he was considering getting that sum by public issue. If he did so he was quite likely to incur expenses up to 20 per cent. and possibly more. The question arose whether it was not possible to cut down this cost. The transference of money direct from the public to the manufacturer or the company controller was a complicated process in which a number of people took part—bankers, brokers, auditors, accountants, solicitors, finance houses—and each required a little remuneration, which together made a large total. Although it might be possible to clip a little off each of these comparatively small amounts, it would not be possible with the present organisation to reduce the total by any considerable sum. That could only be done if some of these intermediaries could be removed.

He had taken the case of a man who wanted to borrow £50,000. If he borrowed less than that in the market he would find that his proportionate cost would be appreciably increased; and vice versa. Certain expenses varied directly with the amount of issue, certain others were constant, and others, again, even increased as the issue became smaller, *e.g.*, the little-known company making a small issue would probably have to spend more on advertising than the well-known company making a large issue.

The potential borrower might decide to seek cheaper capital else-

where. However, once he left the London capital market he got into regions which were very little organized. In the past few years certain private organizations had been formed in the hope of making good this deficiency. They provided medium-term capital, usually in the form of loans, without all the expense of public issues. Their activity, however, had been very limited, partly no doubt because of the comparatively buoyant conditions prevailing in the issue market from 1935 to 1937, but primarily because, in order to safeguard their capital, they had had to put severe limitations on the type of borrower. Anyone with a new invention to be exploited had therefore little chance of borrowing from them, and had to look elsewhere, possibly to personal friends or residents of the locality, or to businesses which might later be interested in the new venture as suppliers or customers.

MR. A. T. K. GRANT said that there were two basic considerations : first, that incomes were gradually being equalized, and with greater equality and less superfluity there would be a greater demand for certainty and security as regards any assets owned ; second, that with a rising standard of living there were likely to be more variable and uncertain preferences between different products, so that the profits of any enterprise were likely to be more speculative and uncertain. With these two tendencies developing, we were approaching the position where we had, on the one hand, savers who would not invest in the specialized sense that Mr. Gordon had indicated, and, on the other, businesses which needed capital but could not offer the type of security which would appeal directly to savers. There was nothing of itself new or wrong in that position, but it did throw an added burden on the intermediary organization ; the whole system worked in such a way that the original savings at one end of the chain and the final investments at the other were related through a series of organizations whose task it was to transform the character of the savings by appropriate risk-spreading. Therefore the question how far these organizations were working effectively was a vital one. It had to be remembered that dislocation would first show itself, not in visible statistics or in the London capital market at all, but in the lack of finance, probably well outside London, for small and new growing enterprises which could not offer a three-year profit record such as even finance houses in London demanded. If this were the case, the first sign would be, not lack of funds on the London capital market, but lack of new business coming forward, having ripened to a stage at which it could appeal to the London capital market. In 1937 in London, when conditions were approaching normal, the complaint was of an excess of funds and an inadequate number of businesses. We had to look for signs of dislocation outside London and, incidentally, outside statistics.

An important aspect which required investigation was the part played in easing the work of the capital market by the mere fact of rising land values, giving very substantial capital appreciation. Somebody had acquired large sums of money in this way, and many of those sums of money, he thought, had been a help in providing funds of a more speculative sort for the development of new enter-

prises in the earliest and most difficult stages. Unfortunately, that was the sort of proposition which was quite beyond proof, and little more than a guess. But at the same time there was this phenomenon of towns developing sensationally, and it would be interesting to know how far the land value profits around those towns might not have helped to swell the funds which at the very earliest stage had been engaged in the new enterprises. Then there was the question of mobility of funds. Once a certain stage had been reached the Stock Exchanges made funds available for long-term purposes in all parts of the country, while the banking system did the same thing for a different type of finance. But when we considered what might be described as initial risk-bearing capital there was little possibility of a person in one part of the country who was willing to invest finding an appropriate business in other parts of the country, given the absence of personal knowledge. Could not the banks or insurance companies, both presumably well represented in different parts of the country, do much more in helping to make contact between investors and borrowers, not necessarily involving their own funds? The dislocation of which he had spoken, therefore, would show itself first and more strongly in what might be called the submerged part of the capital market, where financing was taking place, but about which no details were obtainable. Details of successful financing in the provinces were trade secrets, and the bread and butter of accountants. In the middle of last century the principle of limited liability was extended to industry in general. The economic world would have looked very different had that principle not been so extended, and it seemed we were now getting into a phase where we were going still further towards what might be described as institutionalization, and it would be necessary to develop institutions to provide finance at a much earlier stage in the financing process. The change would be no more revolutionary.

In his paper Mr. Gordon suggested that he (Mr. Grant) had taken the view that private holders of stocks and shares were more important than the investment intermediaries. There was misunderstanding here: his point had been merely to stress the size of the holdings in industry directly in private hands; he did not disagree with Mr. Gordon as to the importance of intermediaries in so far as the forces of current financing were concerned.

DR. C. O. GEORGE said that he would confine himself to the interesting statistical section and its basic conclusion that savers did not invest and investors did not save. Mr. Gordon had found support in *National Income and Outlay*, but one wondered if Mr. Cohn Clark would entirely agree with Mr. Gordon's interpretation and conclusions.

He would make one preliminary remark. It might be suggested that not only did the poorer class invest, but in one special sense they invested before they saved—in buying houses with borrowed money.

The main question to be asked was whether Mr. Gordon's Table II supported his thesis to the extent he claimed. Firstly, it was noteworthy that the largest increase appeared in Group III which

had risen from £108 millions in 1925-26 to £150 millions in 1936-37. Secondly, his conclusions depended on the use—implied but not explained—of the multiplier. Applied to the constituent items it was a very risky device, and even when applied only to the aggregate figures, acceptance of the multiplier demanded many assumptions. But it could not be assumed that the age and sex distribution or mortality rates were either identical or unchanging in the various estate-owner classes. It was, for instance, noticeable that between 1925-26 and 1936-37, the proportion of estates belonging to dead females had only increased from 42 to 45 per cent. It might, therefore, be doubly significant that the proportion of estates exceeding £100,000 belonging to females had increased from 13 to 25 per cent. The spasmodic character of estate-duty figures was another danger signal. For estates exceeding £1 million, the 1936-37 total of £21 millions was, with one exception, the lowest for twenty years, yet the total had recently exceeded £45 millions on three occasions, in 1927-28, 1930-31, and 1933-34.

Then there was the question of lag, three aspects of which might be mentioned. Firstly, there was the usually assumed lag of three months, deaths of a calendar year being taken to correspond with estate-duty statistics for the financial year. This might for the present purpose be ignored. Secondly, there was the alleged lag whereby newly-created properties or increases in values were not reflected in estate-duty statistics until a generation later. This had caused discussion years ago, but it was now generally realized that increased values were reflected in the statistics almost immediately. Incidentally, Mr. Gordon had made no correction for the change in values since 1925 which might have strengthened his case.

On the other hand, no allowance had been made for the all-important factor of evasion, which might conceivably reverse some of his conclusions. Evasion took many forms. And in this connection, perhaps, increases in taxation might be of more importance than the actual rates. Here entered the third type of lag; it took time for the effect of tax increases to become fully operative and for evasive dodges to become widely known and practised. There had been increases in the estate duty in 1907, 1909, 1914, 1919, 1925, and 1930, and although some of these had worked themselves out by 1925, the figures for the years reviewed were no doubt affected by a tendency towards increased evasion, which was itself the result of current tax increases superimposed upon the after-effects of preceding tax increases. How far, in the absence of any reliable estimates of the extent of this evasion, inferences from estate-duty statistics were justified was a question demanding much thought.

MR. T. W. WYATT said that a very important item in this question of the capital market, and one that was often forgotten, was borrowing. A very large amount of capital was provided, particularly for the purchase of the speculative type of security, from this source. The activities of the building societies must also not be overlooked. The increased capital values caused by the boom in land had already been mentioned. He would suggest this was very largely due to the

activities of the building societies, which had largely financed this and the boom in building, and thus made very large sums available for investment in other ways, often of a speculative nature.

The availability of capital when a call was made on it depended on many circumstances about which very little was said in the paper. It would be interesting to find the reason why capital was available at one time and not at another.

Another important point was the question of the capital market as regards Government borrowings. From what source were these borrowings during the next few years to be obtained?

An important aspect of the capital market was the insurance companies, and another the Government's policy of cheap money. The insurance companies, by modern mass selling of insurance, were obtaining funds which they had considerable difficulty in investing at a reasonable rate, and there was no doubt that, following the advice of certain economists, they were invading the equity market.

MR. FRANKLAND said that he quite agreed with Mr. Gordon that the influence of the Life Assurance Offices was seriously understated by the estate-duty figures, but not for the same reason; the effect of policies being issued under The Married Women's Property Act was insignificant; the important point was that they took no account of the large number of endowment assurances which matured before the death of the assured. Much of the money appearing in the estate-duty figures was directly due to the proceeds of such policies but did not appear as such.

He was interested in Mr. Gordon's question why the Life Offices did not invest more extensively in equities. Speaking as an Actuary in a Life Office, he would say that one important reason was the fear of criticism. The business was very competitive, and it was necessary to avoid the criticism of others: it did not affect the situation that such criticism was uninformed. He thought that most offices would gladly expand their equity investments if only this feature were removed.

MR. A. P. L. GORDON, in replying to the discussion, said that he would reserve the greater part of his reply for a written contribution. At this stage, however, he would like to record his appreciation of the point raised by Mr. Frankland regarding the growth of endowment assurance. He was fully aware of the important part played by this type of business, though he had no previous knowledge regarding the relative importance of endowment assurance and of the Married Women's Property Act in accounting for the comparatively slight growth in the amount of insurance policies brought into the Inland Revenue returns. Mr. Frankland's statement of the position, however, emphasized afresh the importance of the Life Offices as intermediaries between saving and investment.

The most important criticisms to be answered at the present stage were those of Mr. Hartley Withers. In the first instance, the basic question was not the power of industry to get the capital

funds which it needs, but rather its power to get them at the times and in the manners which would give the optimum result. In his (the author's) submission there existed a strong case for the conclusion that current conditions did not produce the best possible results; and this conclusion was not set at nought by referring to the increase in the reserved profits of industry which, desirable as it might be for individual companies, did not help those which lacked abundant profits available to be ploughed back.

The kernel of Mr. Withers' remarks lay in his defence of the Unit Trust system. The charges made by the sponsors of the movement looked on paper to be very moderate, but the stated "loading" charges were not the only revenue accruing to the management companies. The 20 per cent. figure given in the paper had been based partly on estimation; but since the paper was written the matter had been investigated systematically in a supplement to the *Economist*, which, though it showed such high figures to be exceptional, made it clear that a figure in the neighbourhood of 14 per cent. was quite usual. He agreed with Mr. Withers that this revenue was not all profit, but it was nevertheless a charge on the money subscribed.

MR. WITHERS : It is a charge borne by all investors.

MR. GORDON said that some of it was. The cost of spreading a very small investment through the Unit Trust movement was probably smaller than that of securing a corresponding spread by direct purchase in the market. On the other hand, he believed that the Unit Trusts had found the very small accounts unprofitable to handle; and, in any case, heavy charges obviously went some way to annul the advantages which might otherwise have been claimed for this form of co-operative investment.

MR. GORDON later wrote as follows: The task before me, in opening this discussion, fell into two natural divisions, the one being descriptive and analytical in regard to the structure of capital ownership, the accumulation of savings and their use; and the other critical of the social and economic results of attempting to cope through existing institutions with the requirements of investment on the one hand and of the owners of savings on the other. My remarks were intended only as a preliminary survey of ground which cannot be quickly or easily covered, and I should like to express my gratitude to the Fellows who have taken part in the discussion for their suggestive and helpful criticism. On the analytical side, Mr. Hawtrey has found the weakest point in a survey of this kind, in his criticism of the tentative line at which I divided the saving from the dis-saving groups. I was conscious from the outset that, on any absolute standard, the criterion was of slender value, since it only establishes the minimum point at which sales of capital assets must be made by executors. This, however, is a valuable datum-line for present purposes, since it measures the point above which the capital market must be prepared to absorb sales. I can see no way,

on existing information, of establishing the size of the estate-group above which the annual saving in the group as a whole is smaller than the group's annual dis-saving through death duties and other causes. Such a dividing line, however, undoubtedly exists; and the increasing concentration of industrial ownership in the larger estate-groups, which is shown in Table III, emphasizes the character of the social problem to which I have attempted to draw attention. The combined influence of present institutional organization and of present saving habits (as modified by taxation) is forcing more and more of the ownership of industry into the hands of investors who do not save, and creating a growing demand for claims among savers who do not invest.

I agree with Dr. C. O. George that no survey of this kind is possible unless the estates passing in a given year are treated as a true sample; and this involves assumptions which may not be wholly true. This is another of the inherent difficulties which can be stated but not quantitatively surmounted. I am not clear, however, that the added incentive to evasion in the years concerned can necessarily be assumed to have exceeded the effect of the various steps which have been taken to prevent avoidance. Moreover, my argument is based on changes in the constitution of estates in the different groups, and I have made no attempt to draw inferences from the relative sizes of the groups themselves. Thus Dr. George's main criticisms, based as they are on the need for allowing for changes in sex and age distribution, are a useful *caveat* for future investigations, but do not appear to affect the present argument. Allowance for changes in value since 1925 would probably, as Dr. George says, have strengthened my conclusion. Such an allowance, however, would have to be computed and applied to each of the items, and much difficulty would arise about the proper allowance to make in the item relating to the securities of Joint Stock Companies, which is the most liable of all to fluctuation in value and which is composed of Debentures, Preference, and Ordinary shares in proportions which are not only unstated but which may also be expected to vary between estates of different sizes. Since this discussion was intended only as a preliminary survey, I thought it best to defer the attempt to compute such an allowance, the inclusion of which might have focussed discussion on matters of detail and diverted it from questions of principle which are the chief concern at present. In this connection, however, it may be well to point out the support given by a closer scrutiny of Table II to my thesis associating industrial ownership with speculative incentive. It will be noticed that, in Groups III and IV, when it is remembered that 1928 and 1936 were years of boom on the Stock Exchanges, the figures are consistent with a much greater preference for volatile securities than is shown by the smaller estate-groups which are almost certainly the greater contributors to the nation's accumulation of savings.

I am grateful to Mr. Grant for his point that a mal-adjustment in the supply of capital funds would first show itself in ways which do not affect the statistical returns relating to the organized capital market. Industrial expansion must always depend upon the

informed risk-bearing to which Mr. Hawtrey refers, and this again draws attention to the point made by Mr. Withers that the funds for this type of risk-bearing are increasingly provided, not from private savings, but from the undistributed profits of industry—a fact which is in itself tendentious evidence of the type of mal-adjustment which Mr. Grant foreshadows. I would repeat that such a condition, however advantageous it may be for individual companies, brings with it a number of problems which may diminish the advantages from the standpoint of the community as a whole, such as the deferment of improvements until existing plant is written off. It is also noteworthy that enforced reliance on funds of this kind is an embarrassment, not only to new enterprise, but also to established industries which find it impossible to earn an adequate surplus after the reasonable remuneration of their stockholders. This has in recent years been evident in industries which are essential to the national well-being. The steps which were necessary, for example, to re-establish the fortunes of the steel industry, and to divert savings into its re-equipment, are fresh in everybody's mind; and the railway industry, with difficulties not wholly of its own creation, has been shown to be hard pressed to continue the finding of capital funds from its own resources.

It would seem that industry is being forced to an increasing extent to choose between three possible sources for the supply of capital—its own undistributed profits, securities so constituted as to appeal to the growing demand for claims and for the supposed security which they represent, and securities designed to offer a palpable speculative opportunity. Each of these carries with it obvious disadvantages. I do not suppose that anybody would find social benefit in the speculative excesses which were associated with the post-war boom in cotton, with the growth of the rayon industry, or with the early days of coal carbonisation at low temperatures. It is by no means clear that such events can be eliminated, as Mr. Selwyn suggests, by revision of the law and practice relating to prospectuses, since this would not destroy the growing speculative appetite in the larger estates. The disadvantages inherent in excessive reliance upon undistributed profits, or upon the creation of fixed claims secured on an uncertain earning capacity, are too evident to need any further emphasis.

There is little in the discussion to modify the view that the present organization of the capital market is not working to the best advantage. It is possible that Mr. Frankland may be right in attributing much of the blame to the fear of criticism pervading the investment policies of Life Assurance Offices, a fear which can be traced in large measure to the basing of contracts on assumed rates of interest. There can be no doubt that the Life Offices are among the most important of the investment intermediaries, and their policy and investment organization must play a large part in determining the fortunes of the capital market. On the other hand, it is doubtful whether this is the whole of the problem. The current structure of the capital market dates from a time when the bulk of the nation's savings was derived from the larger estates; and,

now that this condition no longer prevails, some revision of the machinery may well be desirable.

As a result of the ballot taken during the meeting, the candidates named below were elected Fellows of the Society :—

Victor Edelberg, B.Sc. (Econ.), Ph.D.

Charles Leslie Paine, B.Com.

Ernest Weiss, Dr. rer. pol. & jur., Ph.D. (Econ.).

SOME ASPECTS OF THE TEACHING OF STATISTICS

BY JOHN WISHART

[Read before the ROYAL STATISTICAL SOCIETY, June 20th, 1939, the PRESIDENT,
PROFESSOR A. L. BOWLEY, C.B.E., in the Chair.]

INTRODUCTION

WITHOUT extensive research into past volumes of the Society's *Journal*, it would be impossible for me to say whether, and if so how often, the teaching of statistics has formed the subject of a paper to the Society. My impression, however, is that little, if any, attention has been paid here to the purely pedagogical aspects of the science which it is our duty as a Society to advance by all the means in our power. This fact alone should be a sufficient excuse for my asking you to bear with me for a short time while I put forward a few tentative opinions, or attempt, if imperfectly, to direct your thoughts along the channel of what ought to be taught, and how, and why. But there are other reasons. A teacher myself, I am well aware of the fact that teachers form only a small minority among the Fellows of the Society. Just as in the case of the parallel, and to a certain extent coincident, minority of those who revel in the intricacies of mathematical statistical theory, I have a feeling that what the teacher may have to say may not be of very great interest to more than a small circle of Fellows. But when it is considered that the Society consists of statisticians who are concerned with the applications of the subject as taught to-day, and who are looked on as the potential absorbers of the product of teaching at more than one university, it is only right that the teacher should try to take the practical statistician into consultation with a view to finding out what it is most desirable that the student should be taught. Particularly is this necessary with a subject in which, so far as I can make out, there is a considerable gap in its pedagogical aspects between the "producer," by whom I mean the mathematician who is engaged in developing the theory of the subject as we now understand it, and who also may be a teacher of theory, or, to a limited extent, of method, and the "consumer," by whom I mean the official statistician, whose training is more often in economics than in mathematics, or the business statistician, who may not be adequately equipped in either direction, and may have to rely for instruction in statistics on teachers who have themselves been little influenced by modern mathematical developments.

COURSES IN STATISTICS

The subject is one which does not yet figure very prominently in the curriculum of the ordinary University. For some considerable time courses have been given in connection with training in economics, but these are usually of an elementary character, and have not often been given by mathematicians. Yet the subject is essentially mathematical in character, for apart from the technique which has to be acquired in the collection, tabulation and presentation of numerical data, the problems it generally sets out to solve, and the inferences that can be made from the observed data, are based on probability theory. In recent years a certain number of courses have sprung up which are directed to acquainting biological students with the elements of statistical methods, while in addition it is found necessary nowadays to give similar courses to students of education and psychology. But again, these courses are not often given by mathematicians. Courses in business statistics, and also in connection with the study of education, are given much more systematically and extensively in America than in this country, yet I think it is true to say that this country stands out as the one in which the greatest amount of pioneer development of the subject as a branch of applied mathematics has taken place. The University of London does more for the subject than any other University in Great Britain. Until a few years ago there was only one chair in statistics, associated with the London School of Economics, and held with distinction until recently by Professor Bowley, whose book on the "Elements of Statistics" has for long been a standard work of reference. University College is the only place in the country where it is possible to study for a degree in statistics. There is now a Professor in the subject at this college, and while at one time the mathematical qualifications of the students who entered on this course were not high, which naturally was reflected in the amount and quality of the instruction provided for them, the fact that there appears to be an increase in the demand for mathematically trained statisticians in the business and research fields, and that statistics is beginning to be recognized as an important profession for the mathematical graduate, furnishing a suitable outlet for the man who does not care for school teaching, has led to a number of students going on from the mathematical faculty to take the degree in statistics.

At Cambridge, until 1931, courses in statistics were given by the same lecturer to economists on the one hand and to biological students on the other, the only course available to the mathematician being one on the Combination of Observations, primarily intended for the astronomical student. Since that year the Economics Faculty

has provided lectures in statistics, separate and distinct from the other teaching given in the subject at the University. In addition, the Faculty of Mathematics has provided courses in the Theory of Statistics at the highest stage in the curriculum for the Mathematical Tripos, and this has been supplemented by voluntary practical classes. Selected graduate students have been able to do post-graduate study in the subject, prior to taking up statistical posts. Other courses have been added. Since many of those who take Part I of the Tripos do not proceed to its later stages, an introductory course in statistics, which is not included in the examination syllabus, was arranged for their benefit. Students who take the half-subject mathematics for the Natural Sciences Tripos are also given a short course on statistics. These two courses were merged for some time, but while at first the courses were imposed, not because of a demand from the students, but because it was thought to be a desirable part of a mathematical education, the interest taken in this part of the curriculum has since become so great that pressure of numbers has now led to its being necessary to give these courses separately. This fact, together with the recent decision to begin the formal instruction in the theory of statistics at the Part II stage, has led the Faculty of Mathematics for the first time in history to appoint to its staff a lecturer in mathematics who is primarily qualified in statistics. The courses in method for biological students have gone on, while a further course in elementary statistical methods is given to students of psychology. It is worthy of remark that the same teacher has given the lectures on theory to mathematicians, and on method to biologists, and that he is a man who is primarily assigned to the Faculty of Agriculture as consultant in statistical matters in connection with the experimental work of the various Research Institutes.

There are other Universities where, apart from the needs of economists, provision is made for the study of statistics. For a long time Edinburgh, as part of a mathematical laboratory course, has introduced its mathematical students to the subject of statistics, and now advanced instruction for the specialist is available. In Leeds statistics figures as a part of the examination leading to a degree. Elsewhere, particularly where a University has an associated Research Institute devoted to teaching and research in Agriculture, the need has been felt to provide instruction in statistics, but we are very far yet from the stage where all Universities will find it necessary to provide, as part of the mathematical staff, someone who is competent to give courses in statistics. I think it would be a very desirable thing if this were done, and I have a feeling that sooner or later pressure may be brought on the Universities from below

to provide this type of instruction. Mathematical school teachers have for some time been considering whether something more ought not to be done in the way of introducing elementary statistical ideas into the routine of school mathematical teaching than is done at present. The Mathematical Association has more than once, at its annual meetings, initiated discussions on the teaching of statistics. At their meeting in January of this year, Lord Stamp interested a large audience by his exposition of what he considered ought to be included in a teaching course of the methods of statistics, in preparation of the student for a business career (1). The President of the Association gave a sympathetic reception to the suggestion that many of the ideas involved could be introduced at the school stage, and indeed one can imagine the introduction of elementary statistical calculations as improving the ordinary curriculum in arithmetic. Wide publicity was gained last year for the plea put forward by Dr. Darwin, in his Presidential Address to Section A of the British Association (2), for an improvement of our mathematical education both at school and University in regard to the study of statistics and probability. He illustrated what he meant by saying that the elements of probability should also be part of a general education: it was only the train of thought that was unfamiliar, and it was just this unfamiliarity that was the fault of our education. He thought the ideas could be easily brought in in relation to all kinds of other teaching, particularly in connection with mechanics. At a rather higher level, but still he should hope at school, he would introduce the idea of a distribution law. "All these things ought to be examples of a familiar train of thought, and not merely a highly specialised side-branch of mathematics first met at the university." Even higher aspects, such as least squares or significance tests, should "come to be recognized as subjects of central interest, and not, as they are at present, relegated to a remote corner of specialized study."

Considerations such as these have led me to think that the time is ripe for the opening up of the whole question of the teaching of statistics, and the provision for such teaching; for an examination of the stage now reached in the development of the subject, and of the demand that exists in business and other directions for properly qualified entrants to the statistical profession. This is a question that, I submit, should be taken up seriously by the Society, as a learned body concerned with the development of the subject, and willing, I have no doubt, to give whatever help it can in this direction. There are, indeed, signs that the leaders of thought in statistics have passed through a stage of rapid development, wherein the foundations have been laid of an important science of immensely wide practical application, and in the course of

which emphasis has, quite rightly, been laid on the research aspect, and are now sitting back to survey the progress made, and to consolidate their gains, so to speak. This means that they are ripe for the consideration of what the essentials of a statistical education should be, where it should start, what mutually satisfactory theory of probability should be first taught, what axioms and postulates should be given, what fundamental theorems are necessary, how to link up theory with method as taught, and what, in the light of half a century's research, ought to be added to the standard teaching of method.

CRITICISMS AND SUGGESTIONS

Is all well to-day with the teaching of statistics? I should like to incorporate here a number of statements which have recently been published, statements which will serve in some small measure to illustrate my contention that statisticians are beginning to give more attention to the presentation of their subject to the learner, though there is naturally far more than the mere published word which gives me the excuse for my theme. To start with a challenging quotation, Professor Fisher, in the preface to the seventh edition of his well-known book, *Statistical Methods for Research Workers* (3), says: "The conservatism of some university courses in elementary statistics, in stereotyping unnecessary approximations and inappropriate conventions, still hinders many students in the use of exact methods." The same authority, in his Presidential address to the Indian Statistical Conference at Calcutta in 1938(4), which I commend to your attention, says: "I have formed an opinion . . . that statistics in England has suffered severely from the wide separation, due to our long political history, which has grown up between official and academic statistics; or, to speak functionally, between the duties of collection, enumeration, tabulation and publication, which absorb the time of official statisticians, and the duty of study, analysis and interpretation which falls to the lot of the mathematical or theoretical statisticians. A body such as the Royal Statistical Society does something to bridge this gap." Professor Fisher has here placed his finger on a most important point. The divergence that has taken place between the two aspects of the subject has been reflected in teaching, until to-day there are not many economic statisticians who get the opportunity of sound instruction in the mathematical fundamentals, and few mathematical statisticians who are qualified by their training to take up posts for which a "knowledge of economics" is usually required, unless they are prepared to study mathematics first, and then go on to economics. This situation has been accentuated by the development, to which I have already referred,

of courses in method for biological workers, who, if they do not, many of them, understand the mathematics behind what they learn, are possibly more up-to-date than the economic statistician in basing their methods on recently developed theory. The reason for this is, of course, because the happy association of the mathematical statistician with the biological research institute revealed a weakness in experimental technique which was remedied when the statistician, knowing the problems concerned with "small samples" that required to be solved, directed his researches to their solution, and by virtue of his position was able to apply the results of his researches directly. Professor Fisher refers to the "somewhat ludicrous spectacle of entomologists, foresters, plant physiologists and others with no trace of mathematical pretensions, applying freely and with understanding in their daily work mathematical refinements, which most official statisticians could not understand, and which too many teachers in mathematical departments were unable to expound." I can endorse this statement from my experience in so far as it refers to the ability with which the biologist applies "freely and with understanding" the results of recent mathematical research, though I would add, also from experience, that the understanding is sometimes the result of a long and painful process of absorption of knowledge, due to two things: (1) the almost inevitable lack of previous mathematical training in the biologist, and (2) the circumstance that while theoretical research has gone hand-in-hand with application, and mathematician has met research worker, in certain biological institutes, there has not always been the same opportunity in these institutes for elementary courses of lectures to be given. On the other hand, the answer of the official statistician may very well be that it is not necessary for him in his work to understand many of the mathematical refinements, appreciation of which is required by the biologist: he may even claim that he understands, but does not require, these refinements, and he may refuse to consider the spectacle a ludicrous one. The truth here is probably that two somewhat different lines of approach, and training, are being contrasted, and while there is little doubt that either school would be benefited if it knew more, and applied more, of what is taught in the other, the one is not necessarily more universally up-to-date than the other. The success that has attended the establishment of an Industrial and Agricultural Research Section by the Society, in making available in one branch of enquiry methods that had hitherto only been developed, and understood, in another, prompts me to suggest that there is, within the range of the Society itself, the machinery for a closer examination of the relation between recent mathematical statistical research and the operations of the official statistician.

Referring specifically to teaching, Professor Fisher continues : “ I want to insist on the important moral that responsibility for the teaching of statistical methods in our universities must be entrusted, certainly to highly trained mathematicians, but only to such mathematicians as have had sufficiently prolonged experience of practical research, and of responsibility for drawing conclusions from actual data, upon which practical action is to be taken. Mathematical acuteness alone is not enough.” This is a principle which has been adopted by the University of Cambridge in making the recent appointment in the Mathematical Faculty to which I have already referred, and, the reputation in mathematics of this University being what it is, I have no doubt that the circumstances of this appointment will be borne in mind when other Universities consider taking a similar course. I would add just one rider, to the effect that while it is an admitted desideratum that all university teachers should do some research, it does not follow that the research worker necessarily makes the best teacher, or that there is necessarily the time available for the same individual to teach and do statistical consultative and practical work at one and the same time. A possible solution to many difficulties would be to create a Department or Faculty of Statistics as part of the general science (including mathematics) course, rather than leave statistics to be taken care of in a minor way by separate faculties of Mathematics, Economics and Biology, with little or no connection between them. It is a somewhat revolutionary proposal that a Faculty of Mathematics should make provision on its staff for someone who is more than just a mathematician, and when it is considered that the mathematical staff of the smaller university may consist of a Professor and two or three lecturers, the choice is between appointing a mathematical lecturer who will teach statistics among other things, and who will consequently have few contacts outside the Faculty, and the alternative of considering the needs of mathematicians, economists, biologists, psychologists, physicists and others as a unified whole, and creating a small department which shall administer to all of their needs. Particularly where there is an associated agricultural or other research institute, and where also, as at Oxford and Cambridge, there are being built up research institutes in economic statistics, this latter would appear to be the better plan, and it ought to be arranged that one of the somewhat varied staff of such a department that would have to be built up, preferably the Head, should be a mathematician who has had “ sufficiently prolonged experience of practical research, and of responsibility for drawing conclusions from actual data.” Where a comprehensive department, such as I have suggested, does not exist, there is the danger, apart from lack of co-ordination, that some aspects

of the subject will not be adequately catered for. I remember reading in the first Report of the Institute of Statistics, founded a few years ago at Oxford, that while one or two biological enquirers had been answered, it was pointed out that the Institute was primarily for economic statistics. The inference, however, from the enquiries having been made was that suitable provision for the biological research worker of advice on statistical questions did not at that time exist. I understand that Dr. Dudley Buxton used to give a yearly course of lectures, but the gap created by his death has not so far been filled.

POSITION OF MATHEMATICAL STATISTICS

To turn now to another authority, I should like to quote from Professor Neyman's review of the new edition of Professor Karl Pearson's *Grammar of Science* (5). He says, "Paradoxically enough, the very branch which was recently developed largely under the direct influence and inspiration of Karl Pearson himself, is not in a very satisfactory situation. I mean, of course, mathematical statistics. . . . One can easily understand the enthusiasm of the authors discovering more and yet more distant fields where their results could be usefully applied. But this enthusiasm and the rapid and in many respects brilliant development of mathematical statistics could not escape certain dangers. The rapidity of the development in width, so to speak, was associated with a much slower process in depth. . . . Even when authors write on what purports to be the mathematical theory of statistics, they do not aim at the accuracy of proof and presentation to which we have been accustomed in other branches of mathematics for many generations. Lack of clear and systematically arranged definitions . . . makes it difficult for one statistician to understand another. . . . We are to-day in a period 'when it is well to turn attention from its imposing superstructure and to carefully examine its foundations.' The whole body of statistical knowledge should be revised and criticized. . . . Now is the time to set to work so that we may put in order what has been done of recent years: to apply, in fact, to mathematical statistics the principles that Karl Pearson applied in the *Grammar of Science* to science generally."

Professor Neyman is not here referring specifically to the teaching of statistics. But in so far as he claims that the subject of mathematical statistics, as a branch of knowledge, ought to be put into a more satisfactory state, he is directing attention to an important aspect of the teaching question, namely, that if Professor Neyman is correct (and it is possible that some of his statements are a little

too sweeping), the lot of the student, who has to learn the subject, and of the teacher, who must teach it, is unenviable in comparison with that of those interested in older and well-established branches of knowledge.

The practical statistician may be inclined to interpolate at this point that if this is the state of things, mathematical statisticians are hardly yet in a position to be able to revise the general programme of teaching, and to relate it to the need for furnishing properly qualified entrants to the profession. Yet the very fact that some of the authorities are beginning to turn their attention from further advances in purely theoretical research to the state of the subject in general is a happy augury for the future, and had this evolution proceeded further there would not be the same point in my addressing you on this subject to-day. The practical man will also, no doubt, point out that, while many text-books on method, with specific applications to economics, business statistics, biology, medicine and education exist, there appears to be no standard treatise on the theory of statistics treated from the mathematical point of view. This would be such a pertinent remark, if made, and refers to so essential a prerequisite of a satisfactory teaching programme, that no excuse is needed for debating the subject at this stage.

NEED FOR MATHEMATICAL TREATISE

It is a fact that those who have taken a leading part in the laying of the foundations of a mathematical theory of statistics have not so far given to the world a standard treatise on the subject, and one asks why? There is one obvious answer. At a time when a subject is new, and in process of rapid development, interest is bound to be restricted to development rather than survey of what has been accomplished; a book written at such a stage would be almost bound to suffer from the inevitably imperfect digestion of what had been offered as food, and from possible over-emphasis, however unintentional, of the contributions made to the subject by the writer, and it would very soon become out-of-date. It is seldom that the results of research into unsolved problems first reaches the world at large in the shape of a text-book, though there are instances where this has been successfully accomplished. Professor Karl Pearson was himself of the opinion that it was exceedingly dangerous to incorporate in text-book form material which had not first been published in the ordinary way in a scientific journal, and had then been allowed a long period of time in which to become assimilated with established knowledge. As he was at the same time convinced that no really active and ardent contributor to research could possibly

allow himself the time to study and absorb at their full value, and integrate with his own work, the researches of other equally active workers, one begins to see why he did not himself write a treatise on the subject of which he was such a master. Even towards the close of his long and brilliant career as scientist and teacher, there is more than one person present who will testify to the extent to which his lectures were being revised and rewritten. My own experience has been that the crying need of the student is for a text-book on the subject. It is all very well for the teacher to refer from time to time to the original papers that he makes use of, but even in the comparatively advanced stage of mathematical education which a candidate for, say, the Part III Mathematical Tripos at Cambridge has reached, it is too much to expect him to make prolonged studies of what previous writers have done while, with the help of the teacher, he is learning his subject from its foundations. In any case, the exigencies of examinations make such a procedure practically impossible, and one generally finds that the student has stored up the references for study "when he gets time." Further, I have on occasion had enquiries from outside for suitable text-books for the mathematical student studying statistics, enquiries I have always found it hard to answer.

Thus, if the teaching of the subject, at least in relation to its mathematical foundations, is to be seriously discussed, I submit that the question of the text-book must be put right in the forefront. For teaching generally, also, this must still remain the important question, for it seems to me that if the question of what should be taught of method to the various groups of students who require it, even if their needs are fairly widely divergent, is to be considered, the first prerequisite is to see what is mutually agreed on as a foundation of theory. It is possible to take such a work and then leave out the proofs, and concentrate on the relevant sections for the particular application in mind, but it is infinitely more difficult to write *ab initio* a book for the economist or agriculturist, making sure that no logical step has been left out, and throughout all to remain convincing.

I have no doubt that more than one person has already tried to write such a book as I have in mind. In fact, every teacher who has once completed a set of notes for lectures on mathematical theory, has the potential material for a treatise in his possession, but it is a long step from this to the finished production. For all I know, more than one such book may be already "on the stocks." All I would say is that expectations of performance which were aroused even as long as ten years ago have not yet been fulfilled. We must all at some time or another have been indebted to Mr. Yule for his excellent *Introduction to the Theory of Statistics*, but the inference

from calling a book an "Introduction" is that something more is eventually required. A step in the right direction has been taken by Mr. Yule, in association with Mr. Kendall, in revising his classic work. In relation to modern small sample work, which has such important practical applications, we now see the veil partly lifted from such mysteries (to many) as the t - and z -distributions, for the mathematical forms of the distributions have now been stated, but a further stage is necessary in which they should be developed and proved in a standard text-book. I venture to suggest that the reason why the standard mathematical text has not yet appeared is because it has been found rather difficult to write. The development of the subject, in so far as the laying of its mathematical foundations is concerned, has coincided with a period of history in which the fashion has been to "write papers." This applies to all branches of science, but in our subject it is true to say that the last forty years have seen a tremendous number of papers on statistical theory, scattered over a very large number of journals of a most miscellaneous character, so much so, indeed, that in spite of the herculean efforts of Dr. Irwin, the preparation even of a complete bibliography must appear an almost superhuman task, let alone the study of the material contained therein. I sometimes wonder whether too much is not published nowadays. In the olden days scholars did a great deal of thinking in the privacy of their studies, and then gave out to the world the ripe fruits of their knowledge. I am not suggesting that scholars to-day do not think equally hard in their studies, but it is possible that they "think aloud" too much. However that may be, it is our manifest duty to sift the wheat from the chaff. Professor Fisher (4), after quoting Professor Whitehead as saying: "The essence of applied mathematics is to know what to ignore," remarks somewhat pithily: "When I read current publications in mathematical statistics I am continually and forcibly reminded of the wisdom of this remark." True, but we all of us have to do the reading and ignoring, and the ambitious writer of a treatise will have to re-read, and re-ignore, a very great deal before he will be in the position to present the world with a balanced and useful work.

SUGGESTIONS WITH REGARD TO A TREATISE

I am not sure that the work involved, in the production of such a volume as I have in mind, is not beyond the capacity of one man, unless indeed he were to be freed from any other occupation, and then were to sit down for five years or so on the job. It would be easier for a number of authorities to write texts which would treat the subject from their own point of view, presenting their own

philosophy of approach, and leaving the student to take his choice, and this is a course that, I think, might be favoured by some people, though it has the danger of introducing the student at an immature stage to conflicting theories, and letting him in on controversial topics, with the possible result that his last state may be worse than the first. A possible alternative, and one that I would myself favour, would be a co-operative venture in which a small number of workers would agree among themselves as to what it was thought proper to include in a standard treatise, and would settle their differences beforehand, or present alternative theories where reconciliation proved impracticable, in such a way as to assist the student to get a reasoned grasp of the whole subject, and not only the student, but the teacher who is taking up the subject at the present stage, and who has not the time, or the facilities, or the equipment, to start in at the beginning for himself. In this latter class I would include, of course, all those who were concerned more with method than with theory, and who were not themselves professional mathematicians, though they would doubtless be grateful to the mathematicians who would present them with a standard work which would give them something of a background, and from which they could select what was required. The present is, I submit, the time for this to be done, and I would urge that serious consideration be given by those competent to perform such a task to the view that they would be rendering a signal service to their science if they were to take it up. The time is ripe, the need is great, and I believe that those who could do it are even now thinking along more or less the lines that I have tried to indicate.

To discuss now what such a treatise should contain would take too long, and lead us far from the central theme of the present discussion. But one or two observations are relevant. It should begin with a study of probability theory, a section which may well prove to be the most difficult of all to write. This is a branch of mathematics which, during its long history, has led perhaps to more rival theories, and more controversy, than any other, and to-day it may even be found that no two authorities agree in all details in what they would regard as a satisfactory probability basis for statistical theory. It is a fact that theories, poles apart in their inception and subsequent development, lead to-day to a common end in tests of significance, and while the final formulæ used differ from one another, there is such a close resemblance in mathematical form, and so little discordance in the results of practical application to numerical data, that one is tempted to think that the end results must be correct, and the point in dispute merely the path of argument by which the end result is reached. However that may be, it

may take long, but should not be difficult, to agree on a theory of probability that would command a fairly wide measure of acceptance. This done, one of the main hurdles may be said to have been surmounted. Thereafter, there is a fairly clear road through distributional theory as an application of probability; the study of distribution functions and their parameters; the theory of estimation (an important section); theories of fitting; tests of goodness of fit; sampling distributions of statistics, leading to tests of significance, where theory meets practice, and which should be profusely illustrated by examples; inferences respecting population parameters to be deduced from samples, involving a close examination of fiducial probability; and so working on by stages through problems in a single variable to those for many variables, and from methods of dealing with homogeneous data to those concerned with data of a multiply-connected character, the important method known as the analysis of variance occupying a central and commanding place at this stage. The whole would, of course, be treated mathematically, and since there is plenty of mathematics involved, on the one hand in pure development work in deriving statistics, particularly when it comes to regression and correlation problems in many variables, and analysis of variance problems, and on the other hand in deducing sample distributions of the commonly-occurring statistics in such a form that they are as far as possible freed from unknown population parameters, it is clear that a fairly formidable mathematical methodological text would be the result, which would have the effect of putting statistics much more clearly on the map as an important and extensive branch of applied mathematics.

EFFECT OF TREATISE ON METHOD TEXT-BOOKS

I have not forgotten the needs of the more ordinary type of student, whether in business, economics or biology. For it is clear that the evolution of the mathematical treatise would have its effect, in time, on the material incorporated in the method text-book. He would be a bold man who in writing such a book would disdain to follow the logical sequence of the standard work, though he would naturally treat his material from the non-mathematical point of view, and would state results, rather than give proofs. The difficulty arising from the student having to take so much on trust could be largely met by a greater preponderance of examples illustrating the application of theory to actual data. The result would be a distinct improvement in what is offered for consumption to the student, and a change of emphasis, and the introduction of ideas that have not yet perhaps found a

place in most method text-books. It will be conceded at once that the needs of the official statistician are different from those, for example, of the biologist. But the difference is perhaps too much enhanced if the book on business statistics leaves out all mention of methods based on the analysis of variance, or if on the other hand the biological text-book is based too exclusively on methods which presuppose a normal distribution of the variables under consideration. The chief difficulty is that, having had a long life, the business or economic text-book has at present got a content of a somewhat stereotyped character, while the biological text-book is also rapidly assuming a similar stereotyped character, but dealing with a subject matter which is in some respects far removed from that of the other. Those, however, who say that the needs are radically different in the two cases should be reminded that they are dealing with the same subject, statistics, that is, with methods concerned with the collection, tabulation, classification and analysis of numerical data obtained from observation, and with inferences respecting the whole population of data to be obtained from what are sometimes rather fragmentary samples. It is significant that in America, where no University is considered complete without its Professor and Department of Statistics, the tendency is for the text-book on business statistics to include nowadays the exact methods of testing significance of means, correlation coefficients and such like, and to add a section on analysis of variance, though this last is still far from adequate. It is surely not too much to hope that this country will not lag behind in this very desirable development.

EFFECT ON TEACHING

An improvement in the text-book will have its inevitable effect on the teaching of the subject. For while it is true to say that there is more teaching nowadays of the theory of statistics to mathematical students than there used to be, it should be added that those who profit by such instruction, while they are entering the statistical profession, due to a greater appreciation than before by business organizations of the value of a previous mathematical education, are not yet being called to any appreciable extent to teach their subject. One has only to be called into consultation by a business man who is concerned with making a statistical appointment, and to look at the applications he has received in answer to an advertisement, to realize that there are plenty of potential candidates who claim to have studied statistics in places where mathematical statisticians do not exist, and where it is probable that the teacher is one who has received his own instruction, either from the teacher who went before him, or from one or other of the current text-books of

method furnished for the business student. I would strongly emphasize the desirability of making more use of the statistically trained mathematician in the teaching of method, but this will be a slow process, and it is possible that the improvement of the methodological text-book will have a quicker effect in opening up a range of knowledge to the student that is not at present available to him.

PRACTICAL WORK

To turn to another aspect of the teaching problem, there is the question of the technical skill that must be acquired by the statistical worker. We may take it that one who is attracted to the study of the subject has already a certain predisposition, not very common to mankind in general, to submit himself to dull routine, involved in the patient collection of data, in the sifting over and extraction of what is valuable from a mass of material, much of which may be irrelevant for the purposes of the immediate enquiry. Further, there are qualities called for, of skill in judgment, ability to keep the objective clear before one's mind, and, not least, skill in summarizing one's conclusions in clear and non-technical language for the benefit of those for whom the information is wanted, but who are not endowed either with the knowledge or peculiar skill of the statistician. The native ability which a man entering the profession possesses can be largely reinforced by careful training, which should not confine itself to imparting method, but should deal with the rather more educative aspects of developing particular habits of thought. There is, in addition, the machinery, it may be called, of the trade, in that extensive computing is called for. This must be taught. Skill in computation is not of very frequent occurrence; the man who is good at figures is still looked on as something of a wizard, even in mathematical circles. Here again it is likely that the man, or woman, who is attracted to the subject, has a predisposition, or a fondness, for computing, but there is need for careful and systematic training, for there is one important prerequisite to the deductions that can be made from the results of application of statistical processes, and that is that the calculations must be correctly performed. Even where the statistician is fortunate enough to have at hand less-skilled labour for the performance of the purely mechanical parts of his work, he must know the processes, and be able to devise checks that will convince him of the absolute accuracy of the computations that he entrusts to others, for his is the ultimate responsibility. This means that courses in statistics should not be regarded as complete unless they have practical work, of a numerical character, associated with them. Where

statistical method alone is taught, practical work is not only essential for the learning of the trade, so to speak, but it can form a very useful substitute for mathematical theory which the student may be ill-equipped to learn. Repeated examples, and the convincing nature of their results in regard to what might be considered the common-sense deductions, together with practice in the application of abstruse methods, and difficult formulæ, will go a long way to relieve the student of any hesitation that may arise through having to swallow something he does not understand. Courses in method should, therefore, be interspersed with practical exercises, which the student should himself perform under guidance, and, since he will very soon get beyond the stage at which simple arithmetic will suffice, he should be introduced to calculating machines, of which there should be a sufficient number for each student to have unrestricted access to a machine during the time devoted to the exercises. The alternative is for examples to be worked out on the blackboard by the teacher after a particular method is taught, and for there to be an associated practical class which should be attended by all students.

The desirability of this will be conceded at once, but it is not so obvious that the necessity of practical classes will be appreciated where the theory of statistics is taught, especially if this is done in association with the mathematical department of a University. The mathematician has an ingrained reluctance to turning to practical applications of his subject, generally leaving this to the physicist or engineer, saying in the process that however valuable it may be, it is not mathematics. This has led to a reluctance in mathematical departments to provide more than short theoretical courses in statistics. However, there are exceptions. For a long time Edinburgh University has provided a mathematical laboratory course, of a practical character, as a compulsory part of the degree course, and it was there I first learnt to compute, though without the aid of calculating machines. This excellent example has, I regret to say, not been followed to any great extent in other Universities. In relation to statistics, Cambridge for the past eight years has offered, within the Faculty of Agriculture, a practical course in statistics at an extra fee, in which each student has the use of a calculating machine. The period is one of two hours a week, and the aim is to accommodate up to eight students, who are cared for by a lecturer and demonstrator, himself a senior student. Quite often this course has had to be duplicated to accommodate the numbers offering themselves. The attention of mathematical students taking statistics has been called to this course, and a large proportion of them have availed themselves of the opportunity. There can be

no doubt, whatever official opinion may be on the general question of what is mathematics, that the students themselves realize that the associated practical work is an integral part of their instruction in statistics, and helps them to an understanding of the subject. It is likely that in the future such courses may become more directly linked with the Faculty of Mathematics by being offered in the newly established Mathematical Laboratory. One interesting feature of these practical classes is the way in which the mathematician, with no knowledge whatever of applications to biology, meets the biologist, with no knowledge of mathematics, on a common plane of ignorance respecting the applications of statistics, and the art of computing, and proceeds to learn the new subject side by side with him. It is no secret that as far as skill in computing goes the mathematician does not always win.

EDUCATIONAL ASPECTS

So far I have tended to concentrate, as is indeed appropriate in this place, on the purely technical side of the teaching of statistics, and its related aspects. A final observation may, however, be permitted on the purely educational side. The business of the educator is to educate, and Universities, Colleges and Schools quite rightly conceive their duties to be far wider than the mere imparting of technical knowledge and skill to their students. In the process of general education they provide a varied curriculum of subjects, which may either be taken generally, as in schools or for the purposes of the pass degree, or specifically by dint of specialization, as in Technical Colleges and University Honours courses. It is the business of the educational administrator to decide the balance of the subjects, including what new subjects shall from time to time be included. What is the position of statistics in this connection? To begin with, it is a new subject, and does not therefore figure largely in the curriculum at present. Would its wider introduction improve the education of the average man or woman, or, more specifically, is its incorporation into mathematics likely to improve mathematical education? The answer to both questions is, I submit, yes. The average man or woman depends for knowledge of what is going on in the world about him on newspapers and the broadcasting medium. He is familiar with published figures relating to unemployment, population, accidents, trade and the like, and while there is a greater appreciation nowadays of the fact that it is a skilled business to interpret officially or unofficially collected statistics, it is obvious that he must take a great deal of what he is told on trust, and he is very largely at the mercy of those who for

their own ends are inclined to misuse statistics and make unwarranted deductions therefrom. Without venturing to enter at all adequately into this subject, it may be said without fear of contradiction that there are still plenty of directions in which the propagandist is permitted to hold sway, whether it be for political reasons, both national and international, or for the private purposes of some individual or organization with a particular axe to grind. A certain amount of appreciation at school, through the homely subject of arithmetic, of what can be reasonably deduced from "figures," and a recital of some of the commonly occurring fallacies, should go a long way towards removing current misconceptions, and should render people less likely to become the slaves of those who would mislead for their own ends, as well as putting people into a better position to continue their education for themselves during adult life. Habits of thought, unfamiliar to most of the products of our elementary school education, will be engendered which should turn that product into more useful citizens. In the narrower sphere, there can be little doubt that a greater attention to statistics as part of mathematics will result in mathematical education being substantially improved in its purely educational aspects. Biology has an important position to-day in education. At one time there was a definite conflict between those biologists who would have nothing whatever to do with statistics, and those who were beginning to see that since their science was one of observation, experimentation and deduction, it was necessary to study statistics in order to see how experiments could best be set up to give clear and unambiguous answers to the questions put, and how the numerical data resulting from such experiments could best be analysed. Resistance to the new order of things came, no doubt, from those who felt they were possibly too old to change the habits of thought of a life time, and who had not had the benefit of instruction in statistical method in their student days. To-day, however, there is a fairly general acknowledgment of the fact that statistics are necessary, and many biological students are encouraged to take up its study, while the study of the principles of experimental design is almost attaining the dignity of a separate branch of science. If that is conceded, then statistics should undoubtedly be recognized as part of a scientific education, and suitable provision made for its instruction.

The opposition which is met with in schools, and in the mathematical departments of universities, where authorities are showing themselves more conservative than in biological departments, is generally expressed by the statement that the curriculum is already full to overflowing, and there is no room for more. This presupposes that all that is now being taught is strictly necessary, and of more

value than instruction in new subjects. But would it be argued, I wonder, that teaching in modern physics, or quantum mechanics, should not be given because the curriculum is, or was, full of the material of classical studies? What is wanted is a review from time to time of the content of a mathematical course, and an incorporation, with due regard to balance of subjects and ideas, of new knowledge and new branches of instruction, if they can be shown to be of signal benefit to the general structure. I am convinced that the time will soon come when statistics will come into its own, particularly in relation to mathematics; if for no other reason the pressure will come from school teachers on the one hand and university students on the other, the former a highly intelligent body of individuals on whom the future of the country is to a large extent dependent, and the latter a group that is taking an increasing and justifiable interest in the provision that is made for their education.

SUMMARY OF CONCLUSIONS

It will be fitting to conclude with a short summary of the points to which I have tried to direct your attention. I claim no special authority in the matter except as a teacher who has made contacts with some, though not all, of the varied aspects of statistical teaching, and who will welcome comments, and criticism, from statisticians generally, and other teachers in particular. I have suggested to begin with that official and business statisticians should be concerned among other things with the training of potential recruits for the profession, and should be encouraged to make known their requirements. Some indication has then been given, so far as my knowledge goes, of the present position of the teaching of statistics. In this connection I have referred to the advances of the present century in statistical theory, and the consequent building up of a branch of study that is an appropriate and useful medium of instruction to mathematicians. At the same time the greater demand for mathematically trained statisticians has led to a greater appreciation of, and desire for, such instruction. I then suggested that leaders of thought in the subject are showing a tendency to-day to survey the field generally, and are interesting themselves to an increasing extent in its presentation. Criticisms have been quoted of the present state of things, not only in relation to teaching, but also in regard to the subject itself in its mathematical aspects. I have pointed to the lack of a standard treatise on mathematical statistics, and have strongly recommended the preparation of such a treatise, preferably as a co-operative venture, since I feel that the student would be helped much better by the issue of a standard treatise which had

the greatest common measure of agreement on the part of a number of authorities, than by a series of books which might perpetuate differences which tend at present to bewilder rather than enlighten the student. Following this, it has been suggested that the appearance of a standard treatise will lead to consequential revision of methodological text-books, and that this will lead in turn to a greater unification and improvement of the teaching of statistics generally. I have touched on the question of the acquisition of technical skill, and of the importance of practical work as leading to a better understanding of the subject. Finally, the importance of statistics from the purely educational aspect has been mentioned, and the hope expressed that it will not be denied its rightful place merely because it is a new entrant to the educational curriculum, or because older and possibly less educative branches of knowledge cannot be displaced or curtailed to make room for the new subject.

References.

- (1) *Math. Gazette*, 1939, **23**, 122-134.
- (2) *The Advancement of Science*, 1938, 21-34 (British Association)
- (3) *Statistical Methods for Research Workers*, 7th Edn., 1939, pp. ix + x. Edinburgh (Oliver and Boyd).
- (4) *Sankhyā*, 1938, **4**, 14-17.
- (5) *Nature*, 1938, **142**, 229.

DISCUSSION ON DR. WISHART'S PAPER

PROFESSOR MAJOR GREENWOOD said that the Society was much indebted to Dr. Wishart for bringing so clearly before it a very important subject. Statistics had been a principal interest of his (Dr. Greenwood's) life for more than 35 years, and for nearly 30 of these he had been, in a humble way, a university teacher of statistics. Like Dr. Wishart, he agreed in principle with the opinion expressed by Professor R. A. Fisher which was quoted in the paper. When he began his statistical education, with no more preliminary mathematical training than the average sixth-form boy of a public school who was not specializing in scholarship work then had had, his difficulties in following Professor Karl Pearson's lectures were great. The attempts he then made and had since made to fill the horrible gaps in his purely mathematical training cost much painful effort and had had but modest success. He thought any young man, having attained the standard of a second-class honours degree in mathematics in any British University, who now began the study of statistics, would within two years obtain a securer grasp of the mathematical theory and technique of statistical science than he had acquired in almost forty years. He would not even salve his intellectual vanity by pleading that during his working life the

subject had been revolutionized; that was true, but irrelevant. He meant, quite simply, that a particular type of mind which had undergone a particular rigid mental discipline seemed to him necessary for the production of the ideal statistical worker.

But this was an imperfect world; there were many who desired, sometimes passionately desired, to be statisticians, whose innate mathematical aptitude and preliminary mathematical training were below those even of sixth-form boys. He would not close the statistical paradise to them by inscribing over the gates "Only Trained Mathematicians admitted."

In the heroic age of statistics there were John Graunt with his shop arithmetic and Edmund Halley, one of the great mathematicians of his time. Both made contributions to the science which would never be forgotten. Did anybody doubt who was the greater statistician? Did many doubt that, without Graunt, Halley would never have done any statistical work? Of the mathematicians whose lives overlapped that of William Farr did any one, or all of them together, make a contribution to the science as significant as his? Sometimes a David felled a Goliath of a statistical difficulty with a smooth stone. It might take a mathematician to prove how truly the stone was aimed. He might (in fact, in the review columns, he sometimes did) express surprise at David's untutored dexterity; but the thing happened. So he agreed with Dr. Wishart's suggestion that academical teaching should be supervised by a joint board whose members came from different intellectual groups. He would never allow a youth to graduate in statistics *co nomine* without a very serious practical test, and he would make it possible to compensate academically for mathematical mediocrity by evidence not so much of mere arithmetical dexterity as of power to pass below and beyond appearance to the reality of a statistical problem - evidence of a quality which he could not strictly define, but could recognize in others; a kind of luminous common-sense. It was possessed to the highest degree by one not with them that day, but he would not name him; it was so much safer to name only the dead. He supposed neither Lexis nor "Student" would be ranked by the experts as highly trained mathematicians, but their statistical work seemed to him informed by this luminous common-sense. Better mathematicians proved how good they were; just as chess analysts and "masters" annotated Morphy's games of chess, pointing out that Morphy overlooked this and failed to recognize that, but that Morphy *was* a very good chess-player. Perhaps the analogy between statistics and chess was not altogether fanciful. Some great chess-players had been highly educated men and earnest students of "the books"; others had not. His guess would be that "masters" of the former class outnumbered those of the latter. But many very great "masters," *e.g.*, Steinitz and Blackburne - had been just chess-players, who discovered their talent by playing chess. He thought there should be plenty of statistical tournaments in universities open to all comers. The advantage of excluding by severe mathematical requirements many quacks was bought too dear if it shut out a single John Graunt.

He was sure Dr. Wishart felt this as much as he did; but he fancied Dr. Wishart underrated the importance of the amateur. Personally he attached more importance to the educational development advocated by Dr. C. G. Darwin, to which Dr. Wishart alluded at the beginning of his paper, than even to the production of a standard treatise on mathematical statistics. Much might be done to interest boys and girls in the higher forms of secondary schools in statistical reasoning and he would like to see statistics a school-certificate subject.

There were other educational aspects upon which he would like to comment, such, for instance, as the needs of the mathematically illiterate by no means devoid of intelligence or even education with whom he as a teacher had had most to do. But there were many other speakers.

SIR WILLIAM ELDERTON said that, broadly speaking, he agreed with most of the paper, subject perhaps to some slight modifications on the lines Professor Greenwood had indicated. There was one aspect of the University teaching of statistics which might perhaps be mentioned, though it did not apply to this country. In the Scandinavian countries there were professors at four Universities who dealt with a combined course of actuarial work and statistics. It might be thought that in such a course the professional side would have an undue advantage over the mathematical or statistical, but when one remembered that the present holders of the professorships were Cramér at Stockholm, Steffensen at Copenhagen, and Meidell at Oslo, he did not think there was any need to regard that as a logical conclusion to be drawn. There one had an example of the possibility of combining the practical teaching on the mathematical side with practical teaching in, at any rate, one subject of business.

He desired to add one other name to the two distinguished names that Professor Greenwood had mentioned—one who would be remembered probably by everybody present, namely, Sir Alfred Watson, who had an almost uncanny way of seeing through the most uncomfortable collection of statistics to the truth behind them.

He agreed with what he was sure was Dr. Wishart's view that there was a difficulty in this subject in satisfying both the mathematician and the practical man. He was afraid it was true that a mathematician would never be wholeheartedly satisfied with the teacher who, though thoroughly interested in mathematical theory, was primarily a practical man and arithmetician. By a practical man he meant one who primarily wanted usefulness in his own walks of life, and he feared that such a person might get little help from much of the treatment and many of the results reached by the mathematicians. Consequently, he would tend to criticize the teacher who was a mathematician and had no great statistical sense and no feeling for or enjoyment in arithmetical calculations. The fundamental trouble would always be that the pure mathematician was not concerned, rightly from his own point of view, with the uses

to which the work might be put, but any person who was a statistician must be utilitarian in his point of view. There, he thought, lay the difficulty in preparing a textbook which would satisfy everybody, and if there was a committee trying to write it, he was afraid it would not be a very happy family.

In talking about mathematicians he desired to record a strange and pathetic but true fact, that in his own profession the people with the highest pure mathematical qualifications had not in general proved to be the best actuaries, and, after all, actuarial work was statistical, whether it was dealing with calculations or valuations or pension funds or mortality. From several years' experience he found that those young actuaries whose method of approach towards their mathematics was arithmetical were more likely to do well in the subject than those whose natural instinct was on the algebraical side, and he suspected that the same was true of other branches of statistical work.

The remarks made by Dr. Wishart with regard to the theory of probability had interested him. He had said that they would have to choose what line of theory they should adopt in connection with their statistical lectures or text-books. Was it to be the old classical one, or was the theory to be built up on the lines suggested by von Mises or on those of Kolmogoroff or Cramér? He wondered whether, after all, from the statistical point of view, they would not be better off if they got rid altogether of that word "probability" and tried to find some other expression instead. Sometimes in his own work they talked of the probability of death at a particular age; the rate of mortality at that age was a much safer expression. He was not sure that when they got down to statistics it would not be wiser whenever possible to avoid the use of "probability" and to use rather the term "proportional frequency" or some other phrase suitable to the particular point being investigated. Perhaps they had suffered in using the word "probability" from the mathematicians who were mathematicians only.

PROFESSOR R. A. FISHER said that it was a particularly happy thought of the Council to invite Dr. Wishart to give this paper, especially as he combined the exceptional qualifications of experience both in research and in teaching. The time was certainly opportune for such a discussion, since, as some of Dr. Wishart's quotations had indicated, the teaching of statistics in this country had fallen seriously behind enlightened practice, so that there was even some danger that the very word "mathematical" might come to acquire a certain derogatory import through association with futile logic-chopping on questions on which all competent practitioners had already made up their minds.

This was a danger against which all who cared for the good repute of mathematics would be careful to guard. The mistakes and mistaken attitude of leading statisticians of the past had, in London at least, filled the place with doctors and experimentalists to whom the very word "statistics" was anathema. It was not desirable that the word "mathematical" as applied to statistics

should be recognized by the rising generation of students as connoting all that was pedantic and unfruitful. The mathematics they wanted was that which resolved ambiguities, penetrated obscurities, and clarified the confusion of spontaneous ideas. The teacher must constantly bear in mind the aim of leading his students to think more actively and more confidently, *because* more precisely, about the actual problems on which their data could throw light. The dilemma in the teaching of statistics had arisen, as Dr. Wishart emphasized, from the rapid mathematical advances of recent years. Such advances, however, were normal in most of the sciences, and he did not himself see any sign of a slackening. The year 1939 would, he suspected, not be thought by the reviewer ten years hence as a resting phase in the history of theoretical progress, but all theoretical advance took time to be exploited. It was much easier to see that the theoretical work of fifteen years ago was fruitful, than it was to recognize the potentialities of what was now being done. There would be no special dilemma for the present-day teacher but for two subsidiary circumstances. First, the recent advances to which Dr. Wishart had alluded happened to affect the most elementary procedures: those which must be most widely taught and at an early stage. These concerned the teacher, therefore, much more than would corresponding improvements in the more elaborate or recondite branches of the subject. Secondly, the teaching departments for an unconscionably long time-lag failed to keep themselves up to date in the actual state of their subjects.

A teacher had heavy responsibilities, and his lot could never be an altogether happy one, but he had a responsibility which he must not shirk on pain of being worse than useless to his pupils and his university—namely, to keep himself abreast of the recent publications in his subject. This demanded a great deal of time, and a substantial part of the time of all university teachers should be allotted to it. He had noticed that bodies which set out the terms of appointment sometimes seemed to be under the illusion that any time not allocated to teaching should be spoken of as available for research. But before research was thought of, the prerequisite of an adequate acquaintance with previous researches must be insisted upon. It was nothing but a misfortune when teachers were encouraged to think that the time left over from definite teaching duties was expected to be spent in original composition rather than in keeping their minds alive, and their courses, by assimilating the advances actually in progress in their subject.

Dr. Wishart was impressed with the possibilities of a comprehensive mathematical textbook of statistics. It was, he believed, no secret that Dr. Wishart had for many years had such a textbook in preparation. There could be no doubt that if the difficulties of such an arduous task were successfully overcome a book of this kind would meet a real need. Yet it might be doubted whether an ideal compilation would prove a panacea for the teacher's problems. After all, it must be remembered that the material on which the teacher could already draw was exceedingly abundant. All the most important procedures could be illustrated from numerous

research papers embracing a great variety of subject-matter. Taken straight from their source, these papers illustrated the methods as applied in practice to concrete problems, and the real question of their appropriateness could be apprehended both in their nature and in their importance. The compiler of a textbook, on the other hand, must endeavour to fit the method into some scheme on which his exposition was planned, and strip his examples of all that concrete detail by which their efficacy must really be judged. The example became a bare illustration of a technique arbitrarily chosen for exhibition, and the method was no longer so easily appreciated as an urgently needed probe searching the secrets of a bewildering body of observation and data.

This was no reason for not writing or attempting to produce bigger and better text-books of mathematical statistics than those currently written, great as the improvement in those had been. It was only a reason for guarding themselves in statistical teaching against a weakness all too prevalent in other branches of mathematics—namely, that of presenting to the student a continuous and simplified summary not as an adjunct to, but as a substitute for, wide and fruitful contacts with the original sources.

MR. R. G. D. ALLEN said that this had been a very friendly paper because Dr. Wishart had asked them to down tools and gather round for a general discussion. As a teacher in the subject, the speaker found that he had a great deal to say on the paper, but he must confine his remarks to one or two points. One of the most interesting was Dr. Wishart's question as to the department in which the teaching of statistics should be conducted and the teachers who should be concerned. The field which the speaker knew best was the teaching of statistics to economists. At one extreme, the teaching of statistics here could be done entirely in the department of mathematics by practising mathematicians who might have some experience of economic applications, without being much interested in the economic field. There were fairly obvious disadvantages in this plan, particularly in the sense that a student would tend to be frightened away by such an introduction to statistics. At the other extreme, the teaching could be done entirely in the Faculty of Economics by those who had an adequate training in mathematics and were interested in practical economic problems. One of the disadvantages here would be that it was not very likely that such teaching would turn out the highly specialized mathematical statisticians required in small numbers in the modern world of business and in official circles.

What kind of compromise could be effected? Dr. Wishart suggested a statistical department which should cater for the needs of all kinds of students. He himself would suggest an alternative which promised to yield better results than the introductory teaching should be carried on in the Faculty of Economics or whatever it might be, so that the student, coming fresh from school without much mathematical or scientific training, could be led gently but firmly into the use of the quantitative method. To

many students this would be all that they would want, or perhaps all that they could master. There would remain a few who, like Oliver Twist, would ask for more, and he suggested that these students might be passed on to lecturers in the Mathematical Department, and also perhaps to courses given to biologists and similar workers.

Dr. Wishart had not said very much about the position of statistical teaching in the United States. He did say that no university in the United States was considered complete without its professor and department of statistics. During a recent visit to the States he (the speaker) came to the conclusion that as regarded the statistical teaching to economists, the Americans were rather backward. In many universities the Department of Statistics was very unobtrusive, and, when it was discovered, the head was often found to be neither a professor nor even what would be called in this country a major lecturer. In one of the more important universities of the United States he found economic students with a real interest in statistics obtaining excellent instruction from a professor in the Mathematical Department— a brilliant teacher.

At the end of Dr. Wishart's paper, it was noted that students were taking a justifiable interest in the provisions made for their tuition. He wished he had said a little more on this point. The Students' Union of the London School of Economics had set up a committee which had reported on the teaching in that institution. The committee contained two students who specialized in statistics, and the report was full of interest and fruitful suggestions. He thought Dr. Wishart would be impressed by the emphasis the students laid on practical instruction, and it was undoubtedly true that there was a good deal of computing talent amongst those who would never be first-class statisticians.

He desired to make a suggestion that a future paper be prepared on the effect of quantitative research upon the formation of social thought and policy. In looking for possible authors of such a paper, he had no need to go further than the present President. They all hoped that, when he vacated his present chair, Professor Bowley would give them a series of papers, and a paper on a subject such as this would provide an excellent means for him to convey some of the fruits of his great experience in the social field.

DR. J. O. IRWIN said that the difficulties of statistical teaching could be divided into three classes: (1) those of the taught; (2) those of the teachers, and (3) those which they shared in common.

The difficulties of the students taught were mostly specific in character. For instance, a good mathematician might find mathematical technique easy, but tabulation and computation harder, he might at first find the principles of experimental design hard to follow, while a clear-headed biologist might follow them easily, and so on. It was rather the latter two classes of difficulty about which he would like to talk.

The difficulties of the teacher varied with his own background and the type of his students, but here again three types were likely

to arise: (1) he had to get his fundamental notions across in a clear and satisfactory manner; (2) there might be difficulties concerned with statistical or mathematical technique; (3) how was he to teach students to draw conclusions? If he was to get his fundamental notions across in a clear and satisfactory manner, in the first place, it went without saying that he must be clear about them himself. Assume that this preliminary requisite was satisfied. If the teacher was an accomplished mathematical statistician, lecturing to honours mathematics candidates, there should be no difficulty; each postulate could be put in unambiguous mathematical language. But this, after all, was an exceptional case; more usually difficulties might arise because of the ambiguity of language. Consider, for example, the various meanings that might be attached to the word "bias." To go into this in detail here would be to enter into too specialized a topic, but it was clearly of the utmost importance that the teacher should make sure that his students, perhaps biological workers, understood precisely in what sense he was using the word.

Difficulties with mathematical technique are sometimes rather difficulties of the teacher than of the taught. For example, it was no harder to learn to work with sums of squares and products of deviations, than with standard deviations and product moments; it was no harder to learn to work out simple cases of analysis of variance than to calculate a correlation coefficient; it was just as easy to test the significance of the difference between two means by the "*t*" method as by the approximate method. Yet a teacher and he thought here the non-mathematical rather than the mathematical teacher brought up to one set of methods might find the other decidedly harder to teach.

He thought, however, that the greatest difficulty of all was to know how to teach students to draw conclusions, also that it was the hardest thing for students to learn, so this came into his third class namely, difficulties which teachers and taught shared in common. Even if it was assumed that the teacher had taught, and the student mastered, all the most modern apparatus of significance tests and methods of estimation, at least in applied work they had to come down to the general question: "What in fact did the results mean?" Here a thorough understanding of the material with which he had to deal and strong common-sense were the most desirable possessions. How could one teach these? How could one learn them? There were no golden rules, but personally he thought that one of his colleagues as he was not dead he would not mention his name, but hoped that the anonymity would be as thin as in the case of the name Professor Greenwood had refrained from mentioning—had erected a series of signposts to the route, in the chapters on common fallacies and difficulties in his *Introduction to Medical Statistics*, and he recommended all interested in this question to read them. The treatment was designedly elementary, but the two principles he had mentioned were by that very circumstance all the more clearly brought out.

He concurred in all that Dr. Wishart had said about the need

for a mathematical treatise. It was too much to expect the undergraduate student to wade through the now voluminous literature. Further, he believed that the background of agreed knowledge that had accrued as the result of the researches of the last twenty years was quite great enough to make the time ripe and the enterprise likely to be successful.

MR. V. SELWYN said that he had had the good fortune to pass through the Institution in which the President had taught for so many years, and he certainly felt that there were various problems which had to be tackled there as regards the teaching of statistics. He had also been fortunate in having had practical experience of statistics, doing statistical research for the last three years for a business firm. His main criticism of the teaching of statistics was the lack of unity between theory and practice. The courses of statistics in the University seemed often to be designed just for the purpose of obtaining a degree. Beyond this he felt they should differentiate between statistics themselves and what the statistics were about— he meant that statistics in relation to biology differed from statistics in relation to economics, each kind presented different problems, and this should be borne in mind when teaching.

There was no doubt of the importance of a sound mathematical background with the emphasis on probability. Those who had any experience of sampling work or had seen some of the tables drawn up by various economists and statisticians in social work knew quite well that the most amazing conclusions could be drawn from correlations.

On the other hand, no amount of education could give the student the intuition necessary for drawing conclusions. There was a sort of common sense without which no student should be trusted to tackle any statistical problem or draw any conclusion. Although those without this faculty might be able to get through their examinations by study of textbooks and notes, they were not competent statisticians.

THE PRESIDENT said that he thought there were some things which he might be expected to say in connection with such a paper as this, because, among other reasons, Dr. Wishart asked for the support of the Society in improving in certain ways the teaching of statistics. If Dr. Wishart had called his paper "Some aspects of the teaching of mathematical statistics" he (Professor Bowley) would have had very little criticism of any importance to make; or if he had called it "The teaching of mathematical statistics applicable to small samples," for on that he could speak with unquestioned authority. But when Dr. Wishart referred simply to "The teaching of statistics," he felt that he must call attention to the Charter of the Society. In that Charter it was stated that certain persons "did in the year 1834 established a Society to collect, arrange, digest, and publish facts illustrating the condition and prospects of society in its material, social, and moral relations; these facts being for the most part arranged in tabular forms and

in accordance with the principles of the numerical method. . . ." The crest of the Society was a wheat-sheaf with the motto "*Aliis extercendum*"—(to be threshed out by others). This crest appears on the cover of the Journal and on the Guy Medals. In a way it was now his own business as an examiner to thresh rather than to teach, and to plough as well as to reap.

Dr. Wishart had headed his paper and gone on with it without defining statistics, and he himself was rather wondering whether he had made some mistake in what he had conceived to be statistics. But in the middle of his paper Dr. Wishart gave his definition: ". . . statistics, that is, with methods concerned with the collection, tabulation, classification and analysis of numerical data obtained from observation"—all that was within the purpose of the Society—"and with inferences respecting the whole population of data"—that became a little dangerously near the expression of opinion which the Founders of the Society forbade "to be obtained from what are sometimes rather fragmentary samples" and that was what he was dealing with in his paper.

Then he noticed that Professor Fisher, in the paper which Dr. Wishart had quoted (Indian Statistical Conference, 1938, Presidential Address), used the phrase: "The concept of standard deviation is in fact insufficiently exact for application without reserve to the small samples of observations which the experimenter can command." A very great part of the mathematical statistics developed during the past thirty years was directed to a study of experiments on small samples, of which agricultural and biological subjects offered a very good instance.

It was a very far cry from the statement of the projects of the Society in 1834 to Dr. Wishart's careful report to the Industrial and Agricultural Research Section on the question of whether on giving 30 pigs an extra dose of protein they put on weight more rapidly than if one did not give them that dose. He did not think that that came within the project of the Founders of the Society. The study of the growth of pigs was not statistics, but the mathematics of experiment, and it was only an incident that the numbers resulting came out in numerical tabular form, and an accident that the part of mathematics which dealt with these experiments was related to the part of mathematics which dealt with larger numbers.

He had put down some of the definitions given by Professor W. F. Willcox in the *Revue de l'Institut Internationale de Statistique*, 1935, pp. 388 *seq.* He had over 130 of them. It was noticeable that the idea of statistics as relating to large numbers with a mathematical background began to come in about 1840. J. E. Worl in that year gave the following definition: "*Ziel der Statistik ist, die Gesetzmässigkeit der gegenseitigen Verhältnisse und Beziehungen, das möglichst Absolute aus den relativen Erscheinungen zu ergründen, das Constante aus vielfach Wandelbaren zu ergründen, und in dem wieder Neuen ein bestehendes Gesetz zu erkennen.*"

Presently in 1880 the definition, "A quantitative record of the observed facts in any branch of science," was given by P. Geddes. Then came Yule's definition in 1911: "By statistics we mean

quantitative data affected to a marked extent by a multiplicity of causes." Again, in 1919, the *New Oxford Dictionary* described statistics as follows: "In recent use Statistics is the department of study that has for its object the collection and arrangement of numerical facts or data, whether relating to human affairs or to natural phenomena." (He took it that the pig was a natural phenomenon.)

Thus one had the development as marked by definitions, and the Royal Statistical Society had departed to some extent from its Statutes by establishing the Industrial and Agricultural Section. He was fully appreciative of the importance of that Section, and he was glad of its existence, if only as a safety-valve for the people who had to think of statistics in that kind of way.

For his own part he would not now venture, with the equipment he had more than forty years ago, to teach statistics. He had never at that time been to a statistical lecture, and very soon he had to put aside what mathematics he had in teaching students who came to him: some of those students were now eminent members of the Society. In the end he found that there were three stages of statistical teaching appropriate to the kind of students who came to him for economic degrees or allied objects. In the first place there was arithmetical statistics, and it appeared to him that if they built up these mathematical statistics without the foundation of very severe training in actual tabulation, definition, and understanding of the material, they were going to have a very ramshackle edifice. It was sufficient for very many statisticians to have that kind of training without the use of mathematics; such as tabulation, graphic work and so forth, which needed a statistical sense, but did not need the equipment of the calculus. That, he thought, was the first stage.

In the second stage he had used mathematics without probability. He would like to put that to Dr. Wishart as quite an important thing. Sir William Elderton had said that he wanted to get rid of the word "probability" from statistical teaching. He himself wanted to get rid of it, or else to have its basis much more definitely established. It might be well to give it another term, but he did not think one ought to introduce ideas of probability in the teaching of statistics except to those who had definite mathematical ability or had had mathematical training.

Then there was the third stage, with which he was not now competent to deal, where probability came in; but there he had found the wisdom of the Founders of the Society was almost sufficient for his purpose, because he was dealing with large numbers millions in society, not with small numbers.

He added that what he had said was not intended in any way to depreciate Dr. Wishart's paper, but rather more closely to define its scope and to place it in some relation to the original purposes of the Society.

DR. WISHART, in reply, said that he fully intended to take advantage of the custom whereby the author of a paper was permitted

to reply in writing. But he wished to say now how much he appreciated the reception given to his paper, which had been prepared in South Devon, a hundred miles or more from the nearest statistician. Since its preparation his spirits had gradually sunk, because he realized that he would be presenting the paper in the presence of Fellows who had spent a lifetime in the teaching of statistics instead of a mere matter of ten years. But there was one thing of which he was very glad, namely, that the President had honoured him by contributing to the discussion, and he looked forward to the opportunity of commenting on what had been said by him and by others.

Dr. Wishart subsequently wrote as follows : -

I am fortunate in having had little criticism of my paper, when there might have been so much. The main criticisms came from the President, but were of the constructive kind and are very welcome. I should like, however, to make some comments. In permitting me to speak on the teaching of statistics, the Council no doubt had in mind the concluding part of the President's quotation from the Charter; "in accordance with the principles of the numerical method." These principles are not defined, and the duty of defining them and of deciding when its work is in accordance with these principles is evidently left to the Society. Thus I believe it to be a proper function of the Society to study the principles of the numerical method, which involves mathematical statistics (applied to any size of sample), and to concern itself with the expounding of the said principles: which brings us to the teaching of statistics. May I take refuge in another quotation from the Charter: "the general interest now felt in statistics has been greatly promoted and fostered by this Society"? A part of my paper dealt with the general educational aspects of a study of statistics, and in trying to assist the Society to foster in this way the general interest now felt in statistics (in 1939, not 1887) I hope I may be considered as acting within the spirit of the Charter.

When we come to my experiment on pigs, we are on more debatable ground. The difference between statistics and the mathematics of experiment is a very subtle one, and I am not sure that I have entirely grasped the point in the President's mind. Surely in that case I helped to collect, tabulate, classify and analyse numerical data obtained from observation, which, according to the President, is within the purpose of the Society! Whether the Society has departed to some extent from its statutes by establishing the Industrial and Agricultural Research Section I must leave the Council to judge, but I would hazard the opinion that the experiment on pigs helps to illustrate "the complex relations of modern Society in its social, economical, and political aspects" (extract from the summary of the objects and regulations of the Society). Economical, certainly; political, possibly; social- well, hasn't the pig got a social life of its own? I turn to the note referring to the establishment of the Research Section (*Journal* 96, p. 531) and find that its purpose was to promote "the application of methods of statistical analysis to problems in industry and agriculture." Later it says, there are

"special research problems involving careful planning and experiment, such as occur from time to time at an agricultural research institution."

What I have said is only germane to the present discussion in so far as the President seems to have implied, firstly, that my subject was too dangerously on the edge of the Society's Charter, and secondly, that I was confining myself to the statistics of small samples. But on this last point I tried to be as general as possible, safeguarding myself in the title from an assumption of all-round knowledge which I do not possess. With much that the President says I heartily agree, particularly where he suggests that mathematical statistics should not be built up "without the foundation of very severe training in actual tabulation, definition, and understanding of the material." I agree also that for many the introduction of probability into their teaching must come at the later stages, but I would add that an understanding of the ideas of probability, in one form or another, would appear to be necessary for adequate deductions to be made from statistical data, of whatever kind.

I am glad to have the support of such a prominent and experienced teacher as Professor Greenwood. He fancied that I underrated the importance of the amateur, but if so it was quite unintentional. I commend his statement that he would like to see statistics a school certificate subject to the attention of the Secondary School Examinations Council. Sir William Elderton is quite right saying that any person who is a statistician must be utilitarian in his point of view. While the pure mathematician is not concerned with the uses to which his work might be put, it has always been my view that the man who teaches statistics should be a very much applied mathematician, and I certainly should not care to encourage mathematicians to pursue research in statistics divorced from practical application. With regard to the text-book, we are hardly likely to get one which will satisfy everybody: my view was rather that we should try to fill a gap at present existing by furnishing a mathematical treatise for those likely to profit by it. May I evade the question on probability by assuming that it was addressed to the audience rather than to the lecturer? My view is that a kind of modified classical probability, based on statistical frequency, has a better chance of acceptance among practical statisticians than anything more elaborate.

In answer to Professor Fisher, I had not intended to convey the impression that there was any sign of a slackening in mathematical advances. Side by side, with normal progress I thought I had detected a tendency, in Professor Fisher himself, among others, to survey the subject generally, and I used this as an argument why a period of possibly greater stabilization than hitherto, on the mathematical side, should be taken advantage of for the production of a text-book. It might be truer to say that for some time I have had a text-book in *mind*, rather than in preparation. I would agree that illustrations from research papers are the finest of all, but Professor Fisher's standard is always a very high one, and I considered

that for many teachers and pupils alike, considerable help would be afforded by a well-documented and self-contained text-book.

By saying that "at the other extreme, the teaching could be done entirely in the Faculty of Economics by those who had *an adequate training in mathematics* . . .", Mr. Allen is underlining what I said in general terms and applying it to a field in which I was unable to dogmatize, owing to lack of experience. What he says about the Students' Union report of the London School of Economics interests me very much, and I should like to know more about this very desirable development. Dr. Irwin and Mr. Selwyn are at one in stressing the importance of teaching students to draw conclusions. There is a bearing here on what I said about the value of statistics as part of a general education. I agree it is difficult to teach, but suggest that statistics, almost more than anything else, would as a school subject lead pupils towards this end, and thus be a useful, indeed necessary, part of a general education.

Fellows will be interested in a letter I had from Mr. Yule, from which I have his permission to quote. He writes: "The paper made me feel (rather depressingly) how different your statistical world is from mine, and how *that* world of yours is to be ordered is not a problem for me. But I would question whether you do not too much ignore the non-mathematician. Most economists and most psychologists are still non-mathematicians. In economic statistics, there is a great deal to be done with little but the simplest of algebra; the non-mathematician may be quite keen, intelligent, and useful, and his needs should not be ignored. A good part of the course or courses for him should deal with the sources of his data, the special risks of misinterpretation, and the special methods used *e.g.*, vital statistics, statistics of trade, methods of estimating national income. For myself, I should be inclined to hold that the non-mathematician might be the better teacher for non-mathematicians; he realizes their difficulties, which the pure mathematician can hardly do. With your desire for more facilities for practical work I need not say I have the fullest sympathy."

As a result of the ballot taken during the meeting the candidates named below were elected Fellows of the Society:—

D. G. Champernowne, M.A.
 Albert Vincent Conrad.
 Ernest Lewis-Fanning, Ph.D.
 Leo Kenneth Mayer.

Robert Robson.
 H. G. H. Singleton, B.Com.
 A. Sivasubramanian.

Corporate representatives.

Harry Heumann, *representing* The National Federation of Building Trades Operatives.

P. H. Westermann, *representing* The International Rubber Regulation Committee.

MISCELLANEA

STATISTICS RELATING TO THE DETERRENT ELEMENT IN
FLOGGING

By E. LEWIS-FANING, Ph.D.

(of the Medical Research Council's Statistical Staff)

EFFORTS to abolish the powers of the Courts of Justice to order floggings for certain offences have been almost continuous throughout the present century. Unsuccessful attempts to obtain Parliamentary sanction to the restriction of whipping to juveniles of less than 16 years of age were made in 1905, 1906, 1907, 1908, and 1911. This humanitarian movement received a severe setback when, owing to the alarm caused by the White Slave Traffic, new powers to flog were given to the Courts in 1912. The intervention of the war and the years of its aftermath followed, and it was not until 1930 that another Bill was introduced into Parliament, this time to abolish whipping entirely. Seven years later a Departmental Committee, known as the Cadogan Committee from its Chairman, the Hon. Edward Cadogan, C.B., J.P., was appointed "to consider the question of corporal punishment in the penal systems of England and Wales and of Scotland, to review the law and practice relating to the use of this method of punishment by Juvenile Courts, by other Courts and as a penalty for certain offences committed by prisoners; and to report what changes are necessary and desirable."

The Report of this Committee * gives a brief history of the powers of the Courts to impose sentences of whipping in this country from 1820 until modern times, concisely sets out their existing powers, and proceeds to discuss and analyse the evidence they examined both for and against the infliction of whipping (a) in regard to juveniles, (b) in regard to adult males, and (c) as a disciplinary measure for convicts in prison. In each section a distinction is made between the position in Scotland and in England and Wales.

In this short paper attention is confined to the second of these categories, namely the flogging of adult persons over 16 years of age in England and Wales. Here the existing powers of the Courts to order flogging are comprised in the following list of offences.

Diplomatic Privileges Act, 1708, section 4.—Male persons instituting any process which might result in the arrest of, or distraint

* Home Office: Report of the Departmental Committee on Corporal Punishment. Cmd. 5684.

on the goods of, the Ambassador or Minister of any foreign State; any attorney or solicitor acting in their behalf; and any officer executing any writ or process in connection with the action. On conviction before the Lord Chancellor or the Lord Chief Justice.

Knackers Act, 1786, sections 8 and 9.—Male persons convicted on indictment of unauthorized or irregular slaughtering of horses or cattle without a licence. This offence is triable at Assizes or Quarter Sessions.

Vagrancy Act, 1824, section 10.—Male persons convicted as incorrigible rogues and committed to Quarter Sessions for sentence: e.g., persons convicted of a second or subsequent offence of indecent exposure, sleeping out, failure to support family, etc.

Treason Act, 1842, section 2.—Male persons convicted on indictment of discharging or aiming a firearm at the Sovereign. This offence is not triable at Quarter Sessions.

Garrotters Act, 1863, section 1.—Male persons convicted on indictment of attempt to choke, suffocate, or strangle with a view to facilitating the commission of any indictable offence. This offence is not triable at Quarter Sessions.

Larceny Act, 1916, section 23 (1).—Male persons convicted on indictment of robbery armed, robbery in company with one other person or more, or robbery with personal violence. The penalty of whipping was originally applied to these offences by the Garrotters Act, 1863, and this provision was transferred to the Larceny Act, 1916, on consolidation. These offences are not triable at Quarter Sessions.

Criminal Law Amendment Act, 1912, section 3.—Male persons convicted on indictment of an offence of procuring under section 2 of the Criminal Law Amendment Act, 1885. This offence is not triable at Quarter Sessions.

Section 7. (5).—Male persons convicted on indictment of a second or subsequent offence of living on the earnings of prostitution under the Vagrancy Act, 1898. This offence is triable at Assizes or Quarter Sessions.

Section 7 (5).—Male persons convicted on indictment of a second or subsequent offence of soliciting for immoral purposes under the Vagrancy Act, 1898. This offence is triable at Assizes or Quarter Sessions.

The Committee argue * that a sentence of corporal punishment is not reformatory, that as retribution it is not in accord with modern theories of penal treatment and that therefore its retention can be justified only on the ground of its value as a deterrent—either in

* Home Office: Report of the Departmental Committee on Corporal Punishment. Cmd. 5684, p. 60.

preventing the individual offender who suffers it from repeating his offence, or in discouraging others from committing similar offences. In the Committee's view the retention of corporal punishment can be justified only if it can be shown (a) that a sentence of imprisonment or penal servitude combined with corporal punishment operates more effectively as a deterrent than a sentence of imprisonment or of penal servitude not combined with corporal punishment; and (b) that for some classes of offence sentences of imprisonment or penal servitude are so ineffective as deterrents that it is necessary, for the protection of society, to add a further penalty containing an exceptional element of deterrence.

Flogging as a deterrent against repetition of violent crime.—The only material which can have any bearing on the first of those two propositions is the after-histories of persons who have been punished for these offences. Such material exists at the Central Records Office of Scotland Yard, but is not available to the ordinary research worker. For the information of the Cadogan Committee an analysis was made of the after-histories of the 440 persons who were sentenced for crimes of robbery with violence during the ten years 1921–30. I propose to discuss briefly the results of the analysis of those 440 cases as set out in the Committee's Report.

The main conclusions arrived at by the Cadogan Committee were as follows :—

1. "Of the three statutory offences included in the term 'Robbery with violence,' which are punishable by flogging, corporal punishment was ordered more freely for 'robbery in company' than for either 'robbery armed' or for 'robbery with personal violence.'" The difference was, however, only slight, and in subsequent analysis no further discrimination was made between the three types of offence. The number of cases and the percentage who received corporal punishment in each category was :—

	Total cases	Number flogged	Per cent. flogged
(a) Robbery with violence	263	85	32.3
(b) Robbery armed	108	31	28.7
(c) Robbery in company	69	26	37.7
Total	440	142	32.3

Testing for statistical significance the difference between each pair of percentages.

Difference between (a) and (b) = $+3.6 \pm 5.3$ per cent.

„ „ (a) and (c) = -5.4 ± 6.4 „

„ „ (b) and (c) = -9.0 ± 7.2 „

and since none of these differences exceed twice their standard error, we conclude that they may have arisen by chance and that flogging is as freely administered for each type of offence.

2. "There is a tendency to make greater use of corporal punishment in the case of persons in the age groups 21-30 and 31-40."

Age groups	Total cases	Number flogged	Number not flogged	Per cent. flogged
Under 21	81	22	59	27.2
21 and under 30	235	83	152	35.3
30 and under 40	87	28	59	32.1
40 and over	37	9	28	24.3
Total	440	142	298	32.3

Using the χ^2 test for significant difference between the two frequency distributions—flogged, and not flogged—the value of χ^2 is found to be 3.0012, whence $P = 0.39$; from which we may infer that the data show no indication that the proportion of floggings ordered varies significantly from age-group to age-group.

3. "There is a slight tendency on the part of the courts to impose longer sentence of imprisonment in cases where corporal punishment is not ordered."

Sentences	No. of cases with the addition of corporal punishment	No. of cases without corporal punishment
Corporal punishment alone	2	—
Recognisances	—	16
Imprisonment under 6 months	8	8
„ 6-12 months	40	64
„ 12 months and over	61	106
Penal servitude	31	81
Borstal detention	—	23

Neglecting those cases in which the prisoner was required only to enter into recognisances, and those cases in which he was committed to Borstal, only 65.7 per cent. of those sentenced to corporal punishment received sentences of imprisonment of more than 12 months or of penal servitude, as against 72.7 per cent. of those who did not receive corporal punishment, but the difference of 6.5 per cent. has a standard error of 4.8 and is not significant. Thus there is no evidence here that it is the practice of the judges to impose lighter sentences of imprisonment when corporal punishment is also ordered. It seems clear that this exceptional punishment is entirely additional, and we have therefore to assume that the cases for which it is ordered were either exceptionally serious offences, or that the known charac-

ters of the offenders were such as to warrant its infliction. The only test of the correctness of the first alternative would be a detailed examination of the histories of the individual trials, which is clearly impossible. Consideration of the latter alternative brings us to the fourth of the conclusions made by the committee.

4. "In cases where the offender has a more serious criminal record corporal punishment was imposed more freely."

Dividing the 440 persons convicted of robbery with violence into three classes :—

(a) those who had not been convicted of any previous crime or only of such minor offences as had been dealt with by fine, committal to a reformatory school or Borstal institution, or imprisonment up to 12 months;

(b) those who had previously been convicted of serious crime;

(c) those who had previously been sentenced to penal servitude or to a long term of imprisonment, we have :—

Previous record	Total cases	Number flogged	Per cent. flogged
(a) Not previously convicted of serious crime	227	57	25.1
(b) Previously convicted of serious crime ...	144	62	43.1
(c) Previously sentenced to penal servitude or a long term of imprisonment ...	69	23	33.3

Between those who had not previously been convicted of serious crime and those with a fairly bad record a statistically significant difference of 18.0 ± 5.0 per cent. is found. All other possible differences between the pairs are not significant, and it is therefore clear that first offenders have more chance of escaping this punishment than those who have been previously convicted of serious crime. To this extent it is true that previous record is taken into account in ordering the infliction of corporal punishment.

5. "Corporal punishment may be a less effective deterrent for persons in the higher age groups."

In order to study the subsequent record of the 440 offenders, down to the latter part of 1937, the cases were classified by the Committee into four groups of persons : (a) who were not subsequently convicted of any offence; (b) who were subsequently convicted of minor offences (*i.e.*, offences not involving sentences of imprisonment or of penal servitude); (c) who were subsequently convicted of major offences (*i.e.* offences, not including offences of violence, involving sentences of imprisonment or of penal servitude); and (d) who were subsequently convicted of offences of violence (including not only

robbery with violence, but also such offences as wounding or assault). Combining groups (a) with (b), and (c) with (d) enables the following tabulation to be made.

Age groups	Sentenced to corporal punishment			Not sentenced to corporal punishment		
	(a and b)		(c and d)	(a and b)		(c and d)
Under 21	15	% 68.2	7	36	% 61.0	23
21-30	32	38.6	51	88	57.9	64
31-40	14	50.0	14	31	52.5	28
40 and over ...	3	33.3	6	12	42.9	16

The Committee justify their conclusion on the ground that among those who received corporal punishment, the percentage not subsequently convicted tends to fall in the higher age groups. But considering each age group separately and applying the usual statistical tests we find that the "success" of corporal punishment as measured by the differences between the percentages which fall into groups (a and b) is:—

	Difference	
At ages under 21	+ 7.2	± 12.1 per cent.
" 21-30	— 19.3	± 6.8 "
" 31-40	— 2.5	± 11.5 "
" over 40	— 9.6	± 18.8 "

Only in the age group 21-30 is the difference between the percentages statistically significant, and thus it seems more correct to infer that at ages between 21 and 30 the subsequent record of persons flogged is definitely worse than of persons not flogged.

6. "The subsequent record of those sentenced to corporal punishment is worse than that of those not sentenced to corporal punishment, except as regards those who previously had the worst criminal record." Treating subsequent records as in the previous section the data may be tabulated as follows:—

Previous record group	Sentenced to corporal punishment			Not sentenced to corporal punishment		
	(a and b)		(c and d)	(a and b)		(c and d)
Not previously convicted of serious crime	38	% 66.7	19	121	% 71.2	49
Previously convicted of serious crime	18	29.0	44	31	37.8	51
Previously sentenced to penal servitude or imprisonment of 12 months or over ...	8	34.8	15	15	32.6	31

Once again comparing for each group the results of the application of corporal punishment with the omission of it, by the differences between the percentages found in the (*a* and *b*) groups, we have :—

				Difference	
Not previously convicted of serious crime				-4.5 ± 7.01	per cent.
Previously convicted of serious crime				-8.8 ± 7.97	„
Previously sentenced to penal servitude or imprisonment of 12 months or over				$+2.2 \pm 12.0$	„

The size of the standard errors of these differences indicates that in every case the differences might have arisen purely by chance. Hence there is no evidence even in the group with the worst criminal record that flogging is successful as a deterrent against the repetition of crimes of violence.

To sum up, the only statistical conclusion come to by the Committee the validity of which is beyond question is that corporal punishment is imposed more freely on persons having a previous record of serious crime.

The remaining statistical conclusions are dubious. It is not clear that any attempt has been made to allow for variation of exposure to risk. A man in prison is not at risk of being arrested, and a man released in 1930 has not had the same exposure as a man released in 1925.

The deterrent effect of flogging on others

I pass now to the main object of this paper : consideration of the effectiveness of flogging in the prevention of crimes of violence through fear of flogging by those who have never experienced it.

Briefly, my method of approach to this problem has been through an examination of the relation between changes in the amount of flogging ordered and changes in the prevalence of this class of crime in the country since 1863.

The data

The data examined are shown in the accompanying table. The ordering of corporal punishment for robbery with violence has been continuously permitted since 1863, and from the published criminal statistics of England and Wales the annual number of crimes of this nature known to the police have been tabulated (col. 2). Whilst the use of “ the number of crimes known to the police ” as an index of the volume of crime is certainly open to objection as regards the volume of total crime and as regards certain petty crimes, there can be very few crimes of the magnitude of robbery with violence which escape this net. Over three-quarters of a century this index must be more consistent than one based, for example, on the number of convictions, the proportion of which would presumably have increased as the

TABLE A

Data relating to Robbery with Violence

Year	Number of crimes known to the police	Rate per million of the estimated male * popu- lation (15 '54)	Number of con- victions (males) † Assizes and Quarter Sessions	Number of floggings ordered	Floggings as per cent. of convictions
1864	691	128.28	298	18	6.0
1865	748	137.28	322	5	1.6
1866	740	134.29	289	44	15.2
1867	739	132.62	261	23	8.8
1868	792	140.57	304	41	13.5
1869	706	123.94	323	44	13.6
1870	601	104.38	231	28	12.1
1871	485	83.34	192	11	5.7
1872	514	87.07	207	36	17.4
1873	478	79.85	175	28	16.0
1874	597	98.35	275	50	18.2
1875	583	94.75	204	—	—
1876	560	89.79	209	—	—
1877	560	88.61	179	8	4.5
1878	611	95.42	208	18	8.7
1879	490	75.54	224	14	6.3
1880	487	74.13	169	8	4.7
1881	440	66.13	161	15	9.3
1882	435	64.46	208	13	6.3
1883	372	54.36	200	36	18.0
1884	436	62.84	123	23	18.7
1885	382	54.31	202	17	8.4
1886	381	53.44	227	26	11.5
1887	392	54.26	221	35	15.8
1888	414	56.56	265	26	9.8
1889	428	57.73	228	24	10.5
1890	347	46.21	156	9	5.8
1891	369	48.52	197	17	8.6
1892	433	55.99	225	18	8.0
1893	386	49.09	210	47	22.4
1894	376	47.05	209	65	31.1
1895	337	41.50	159	30	18.9
1896	289	35.03	167	29	17.4
1897	317	37.84	173	31	17.9
1898	354	41.61	236	35	14.8
1899	279	32.31	170	33	19.4
1900	256	29.21	140	15	10.7
1901	234	26.31	178	18	10.1
1902	274	30.42	205	16	7.8
1903	241	26.43	163	15	9.2
1904	251	27.19	164	10	6.1
1905	223	23.86	143	6	4.2
1906	242	25.59	143	5	3.5
1907	232	24.24	132	2	1.5
1908	310	32.02	144	22	15.3
1909	226	23.07	121	3	2.5
1910	211	21.30	117	—	—

* Annual Report of the Registrar General of England and Wales.

† Includes female convictions until 1893.

TABLE A—*continued*

Year	Number of crimes known to the police	Rate per million of the estimated male * population (15-51)	Number of convictions (males) † Assizes and Quarter Sessions	Number of floggings ordered	Floggings as per cent. of convictions
1911	198	19.76	115	6	5.2
1912	195	19.21	134	5	3.7
1913	155	15.11	110	2	1.8
1914	133	12.95	67	0	0.0
1915	85	10.37	—	—	—
1916	114	15.82	—	—	—
1917	134	21.17	44	0	0.0
1918	100	16.47	34	1	2.9
1919	203	21.18	56	6	10.7
1920	235	23.10	96	18	18.8
1921	211	20.43	91	15	16.5
1922	164	15.57	89	25	28.1
1923	151	14.21	37	13	35.1
1924	122	11.29	52	6	11.5
1925	136	12.51	53	11	20.8
1926	120	10.98	56	14	25.0
1927	110	10.00	47	12	25.5
1928	128	11.55	42	16	38.1
1929	167	14.96	50	18	36.0
1930	217	19.29	86	13	15.1
1931	208	18.41	53	19	35.8
1932	342	30.13	107	61	57.0
1933	219	19.28	64	42	65.6
1934	215	18.94	81	28	34.6
1935	182	15.83	55	12	21.8
1936	189	16.27	65	8	12.3

* Annual Reports of the Registrar General of England and Wales.

† Includes female convictions until 1893.

efficiency of police methods has increased and as the population has become more urban.

The annual number of crimes known to the police has been expressed as rates per million of the population (col. 3), and since we are concerned with corporal punishment administered to adults, and the flogging of females has not been permitted in this country throughout the period under survey, the populations used refer to males between the ages of 15 and 54 and have been taken from the annual mid-year estimates as published by the Registrar General.

Since 1893 the annual number of floggings ordered has been published in the criminal statistics. For the years previous to that date, the data have been compiled from the returns of corporal punishment made to Parliament (col. 5).

Unfortunately the series is not entirely complete, no return having been made relating to the years 1875 and 1876, and, again during the war, for the years 1915 and 1916.

In the last column of the Table the annual number of floggings

have been expressed as percentages of the number of convictions (col. 4), which again have been extracted from the published criminal statistics. Until 1893 it is not possible to distinguish the sex of those convicted, but the number of females included before that year is not likely to be large enough to affect appreciably the annual proportion of floggings.

The series of values for the two indices :

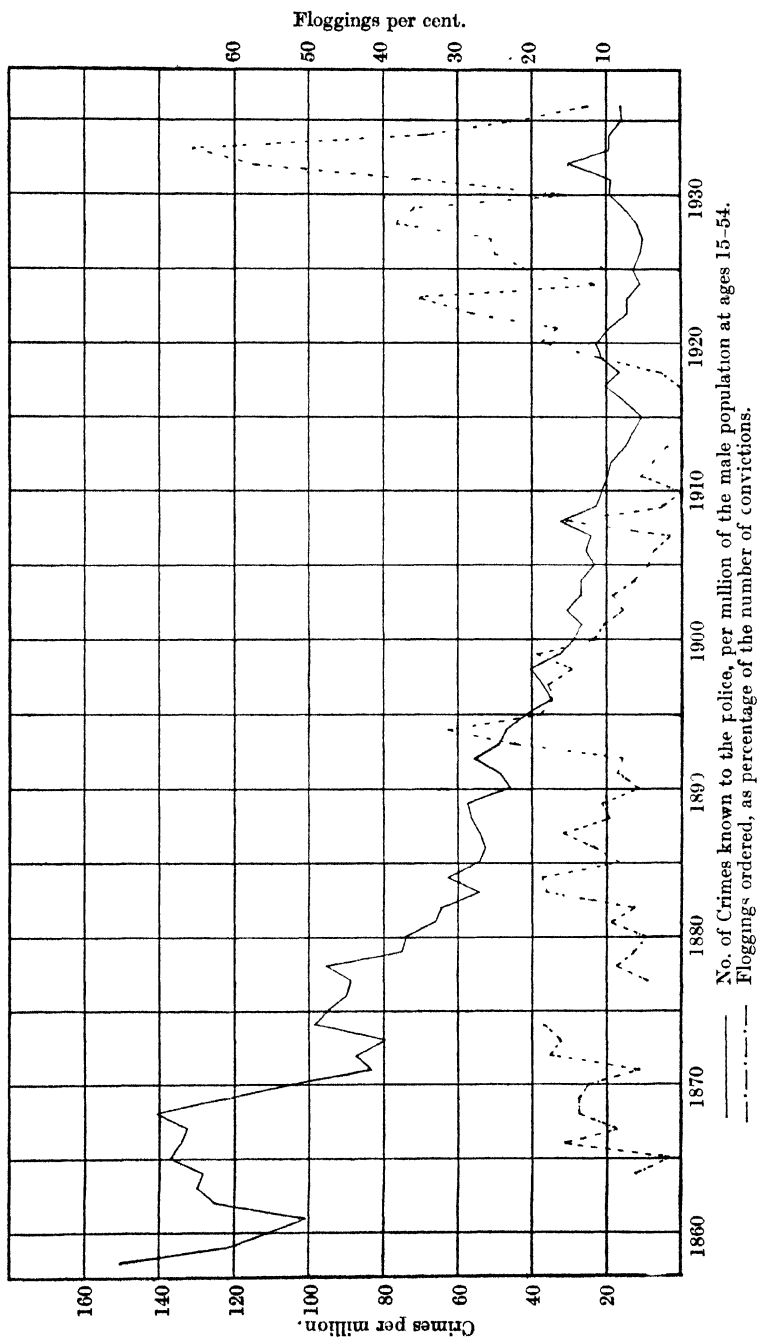
(1) number of crimes of robbery with violence known to the police per million of the male population aged 15-54, and (2) floggings expressed as percentages of the number of convictions for this type of crime, are depicted graphically in Figure 1.

Discussion

No attempt has been made to make quinquennial or decennial groupings of these two series, since (a) the averages obtained would depend largely upon the boundary years selected for the grouping, and (b) if moving averages were used, the smoothed series thereby obtained would mask what seems to me perhaps the most important feature, namely, that the volume of flogging fluctuates quite arbitrarily and has been apparently entirely independent of the volume of crime. Consider, for example, the rise in flogging which is shown for the year 1887. There was no increase in the volume of crime in that year or in the two preceding years to account for it. Nor, apart from two isolated instances (1908 and 1920), does the diagram offer any evidence that a fall in the amount of crime was preceded or contemporary with an increase in the volume of flogging. It is, in fact, the seemingly chance fluctuation in the amount of corporal punishment ordered which the diagram seems to indicate, and which ought to be stressed.

The line on the diagram indicating the volume of this type of crime, shows, from 1870 at least, a regular trend downwards. Its trend, from 1879, is in fact best described by the logarithmic curve $y = 65.494 \times (1.031)^{-x}$, where y is the number of crimes per million of the population, and x the time in years. The downward trend is interrupted slightly in the latter years of the war and in those immediately following it, and again in the period of depression from 1928-32, since when the downward trend has again been apparent.

The fluctuations of the series relating to floggings are so pronounced that probably a straight line will indicate the trend, as well as any other type of curve. The equation of the straight line giving the best fit is $y = 2.736 \times 0.453x$; y in this case being the proportion of floggings to the number of convictions. In more detail we might say that the amount of flogging increased from 1876 to 1894 and then



declined to vanishing point, this being reached both in 1910 and 1914. The interesting feature is that since the war the proportion of flogging has reached figures never before attained. Previous to the war the highest index for flogging was in 1894, when 31 per cent. of the number of males convicted for this offence were sentenced to receive corporal punishment. This proportion was first exceeded in 1923, *after* the increase in the volume of crime which attended the end of the war had disappeared. Again in 1928 and 1929 indices of 38.1 and 36.0 were attained; and in 1932 and 1933 the proportion of convicted persons flogged was twice as great as in 1894, being 57.0 and 65.6 per cent. respectively. Thus, whilst on the one hand, the volume of this crime has steadily fallen in the last sixty years from 70 crimes per million of the population to less than 20 per million, the proportion of floggings to the number of convictions has increased during the same period from less than 10 per cent. to over 30 per cent. and has even reached over 60 per cent.

In the controversy regarding the deterrent element in flogging, the facts just established might be utilized in different ways, according to the views of the participants. On the one hand, it might be argued that as this type of crime has become less common, so it has become increasingly abhorrent to the mind of the orderly citizen, and that this is reflected in the tendency to punish it with greater severity. This, of course, is merely arguing that broadly corporal punishment is imposed on the retributive principle, and although the Cadogan Committee (p. 60) hold that "it would be out of accord with modern theories of penal treatment to justify the retention of any form of punishment merely on retributive grounds," yet the deductions made from these data could be used in support of the argument that, in reality, the retributive principle is very much in evidence. On the other hand, there has always been a substantial body of opinion in this country which holds that outbreaks of crime of this nature have repeatedly been counteracted by an increase in the number of persons flogged. In particular, garotting in 1862-63, the "High-Rip" gangs in Liverpool in the 'eighties, and a wave of violent crime in Cardiff about 1908 have all been asserted to have been checked by sentences of corporal punishment imposed on those convicted of these crimes, and supply material for discussion in the Cadogan Report (pp. 83-5). Those who favour this opinion will no doubt consider that there is support for it in the fact that both series in the diagram show a peak for 1908, the year of the Cardiff outbreak. But it is doubtful whether statistics which relate to the whole of England and Wales can with any validity be held to represent events of purely local significance. And even if this were so, when we consider that portion of the graph covering the period of the Liver-

pool outbreak (1887-94), then it is seen that the first peak during that wave of crime was in 1889 followed by a steep fall in 1890, during which time the proportion of floggings fell to the lowest figure for twenty years, and that the second peak of crime was reached and passed in 1892, at least a year before the amount of flogging commenced to increase.

More generally, the absence of any inverse relation between the two indices such as underlies this body of opinion is shown by close examination of the diagram. From 1894 to 1910 the proportion of floggings was steadily falling. But the number of crimes fell also. And, as already indicated, with the exception of two isolated examples, there is no evidence that a notable fall in the crime graph was preceded by, or contemporary with a peak in the flogging graph, whilst the wild irregularity in the proportion of floggings since 1920 shows how entirely divorced it is from the volume of crime. It appears quite evident that throughout the last sixty years there has never been but the slightest justification for the view that "corporal punishment has put down robbery with violence."

Since, to the scientific mind, mere inspection of the diagram will not be entirely conclusive, somewhat more technical methods have been utilized for a solution of the problem. The annual deviations of the two series from their respective lines of trend were correlated, the value of the coefficient obtained being $r = +0.451 \pm 0.11$. To cover the two further possibilities (a) that a rise in the volume of crime might be followed the next year by a rise in the amount of whipping, and (b) that a rise in the amount of whipping might be followed the next year by a fall in the amount of crime, the deviations of the two series were correlated allowing a lag of one year, first in the crime variable, and next, in the flogging variable. The resultant coefficients differed only slightly from the original value, being respectively $+0.461 \pm 0.11$ and $+0.435 \pm 0.11$. Then, since it is evident that no deviation value in either series is definitely independent of the previous year's value in the other series, the effect of this interlacing was eliminated by computing the partial correlation coefficient between the deviations when both lags were held constant. The result was to reduce the original correlation from $+0.451$, to $+0.114 \pm 0.13$.

It is not, however, suggested that this method of investigation is satisfactory. The secular trend is not adequately represented by a straight line and, in my judgment, greater weight should be allowed to the violent and capricious fluctuations of the percentages of floggings ordered. If, for instance, one takes the run of the figures over the last 20 years of the nineteenth century, it will be seen from the graph that the trend of the crime-rate is reasonably smooth and

decreasing, the flogging-rate fluctuates wildly. Whilst it is easy to account for this fluctuating as reflecting the different views held by the comparatively small number of judicial officers empowered to order flogging as a punishment, it is hard to bring the two graphs into any causal relation, especially in the absence of any knowledge of the facts of the individual cases. The different trends of the two lines would be intelligible if, for example, it could be shown that as the total number of crimes diminished, a continuing larger proportion of them were of a particularly brutal nature.

Conclusion

From a statistical examination of the published records of the volume of crime of robbery with violence, and of the number of persons sentenced to be flogged for this crime during the period 1863-1936, there is no evidence that the infliction of corporal punishment has in any way acted as a deterrent to prevent others from committing such crimes. Rather, does it appear that there is no relation at all between the number of floggings and the amount of crime in the same year, the previous year or the subsequent year. Broadly, the amount of this type of crime has fallen from 70 cases per million of the population in the 'sixties to less than 20 cases per million since 1921. The amount of flogging, on the other hand, which before the war only once, in 1894, exceeded 20 per cent. of the number of persons convicted, has since 1921 only three times been below this figure. Five times has it been between 30 and 40 per cent. and twice between 55 and 65 per cent. This seems to indicate that as robbery with violence has decreased in frequency, so it has become more detestable and has been treated with more severity. In other words, far from being imposed for its deterrent element which it has never possessed, in reality, and to a greater degree than before the war, it is being imposed as a retributive.

REPORT OF THE COUNCIL

For the FINANCIAL YEAR ended December 31st, 1938, and for the SESSIONAL YEAR ending June 20th, 1939, presented at the ONE HUNDRED AND FIFTH ANNUAL GENERAL MEETING of the ROYAL STATISTICAL SOCIETY, held in the Hall of the Royal Society of Arts, John Street, Adelphi, W.C.2, on June 20th, 1939.

THE Council have the honour to submit their One Hundred and Fifth Annual Report.

The roll of Fellows on December 31st, 1938, as compared with the average of the previous ten years, was as follows :—

Particulars.	1938.	Average of the previous Ten Years.
Number of Fellows at end of previous year ...	1063	1054
Number lost by death, withdrawal, or default ...	56	59
Fellows elected or restored to the list ...	76	58
Number of Fellows on December 31st ...	1083	1053

In addition, there were 14 Honorary Fellows.

The Council regret to report that during the sessional year ended June 20th, 1939, the Society lost by death the undermentioned Fellows :—

Fellows

	Date of Election.
<i>d</i> Broomhall, G. J. S. ...	1895
Coutts, Charles R. V., F.I.A. ...	1916
<i>p</i> Dale, John Ainsworth, C.B.E. ...	1933
Franklin, Arthur E. ...	1899
Gladwell, Sydney W. ...	1900
Hall, Professor Fred., M.A., B.Com. ...	1912
<i>p</i> Hoare, Alfred, M.A. ...	1919
<i>cd</i> King, A. W. Waterlow, J.P. ...	1898
<i>cl</i> Lloyd, Godfrey I. H. ...	1903
Peters, John W. ...	1890
*Pryor, E. T. ...	1896
Reid, Leonard J., M.A. ...	1917
<i>d</i> *Stevens, Marshall ...	1885

* Life Fellow.

c Member of Council.

d Donor to the Library.

p Read a Paper or Papers.

The list of losses by death includes the names of several distinguished Fellows. Alfred Hoare, banker, died on November 6th, 1938, at the age of 88; he was elected a Fellow in 1919, was a member of the Council for eight years, and read a paper before the Society in 1925. He was less known to the younger Fellows through his

infrequent attendance in recent years owing to increasing infirmities, but he was highly esteemed by his elder colleagues for his versatility in banking, economics, and literature, for the readiness with which he put his great experience at the service of his friends, and for his genial and original conversation.

Arthur William Waterlow King, publisher, was elected a Fellow in 1898, and served on the Council from 1903, with a few short interruptions, until his death in his seventy-eighth year, on 30th December 1938. He was Vice-President 1918-20 and 1932-34, was active on the Library Committee from 1899 to 1923, and acted as Honorary Treasurer of the Society from 1934. He never read a paper or took part in discussion, but he was seriously interested in the uses of statistics and was a typical representative of that great body of Fellows who, while not themselves practising the statistical art, recognise the importance of the science and give their support to its development. Unsparing in his service to the Society, his advice to the Council was invaluable, and his loss is felt to be irreparable by those who knew him.

The death of Godfrey I. H. Lloyd on February 9th, 1939, at the comparatively early age of 64, is regarded as a calamity by all who knew the ability and devotion to public service which lay beneath his great modesty. As a teacher of economics at home and in Canada, as an administrator in the Department of Overseas Trade, and again at Geneva, he impressed all with his knowledge and ability, and particularly with his readiness to help others. He never read a paper before the Society, and only took a part in discussion when he could communicate something of value, but his influence extended far beyond his infrequent participations in debate. He was elected a Fellow in 1903 and served on the Council during the Session 1935-36.

Mr. G. J. S. Broomhall, who was elected a Fellow in 1895 and died in June 1938, in his eighty-second year, was the founder of *Broomhall's Corn Trade News*, which has for long been a standard source of intelligence as to the grain trade.

Obituary notices have appeared in the *Journal* as follows:—Of Mr. Broomhall in Part III, 1, 38; of Mr. Hoare and Mr. Waterlow King in Part I, 1939, and of Mr. Lloyd in Part II, 1939.

Among the other deaths must be recorded that of Mr. J. A. Dale, C.B.E., of the Ministry of Labour, who read a paper in December 1933 on "The Interpretation of the Statistics of Unemployment," which attracted much attention and is still called for. The list of Fellows of more than fifty years standing was further reduced by the death of Mr. Marshall Stevens, a Life Fellow, elected in 1885.

In succession to Mr. Waterlow King, the Council, under Bye-Law No. 15, appointed Dr. David Heron as Honorary Treasurer for the remainder of the Session.

During the session 1938-39, the following 71 candidates have been elected Fellows of the Society :—

Ashmore, Frank Hardy.	Lomax, Kenneth Sunderland, B.Sc.
Bayes, Alfred Walter.	MacColl, Hugh Geoffrey, M.A., B.Sc.
Beard, Robert Eric, F.I.A.	Mayer, Leo Kenneth.
Beer, William John.	Mead, Frederick Cecil, B.Sc.
Bellamy, Dennis.	Myslivec, Václav.
Benjamin, Bernard, B.Sc., A.I.A.	Oakley, Col. H. J. P., M.C., F.I.A.
Bhargava, B. D., B.Sc., LL.B.	Paine, Charles Leslie, B.Com.
Bhojwani, Khushiram T., B.A.	Patching, Alfred.
Blacklock, Douglas Stewart.	Plumridge, Edward Frederick John, A.I.A.
Booker, Harold Scott.	Potter, Samuel Cameron.
Bourne, John Bernard.	Rahman, Ahmed Ezzeldin Abdel.
Bradshaw, Frank Law, F.I.A.	Richardson, Gilbert.
Bransby, Ernest Roy.	Ridley, Thomas Maurice.
Carson, John Joseph St. Lawrence.	Robson, Robert.
Champernowne, D. G.	Sastry, N. S. R., M.A., M.Sc.
Child, Arthur.	Selwyn, Victor.
Conrad, Albert Vincent.	Shenkman, Elia M., Ph.D.
Damanna, Ranchoddas Varjivandas.	Simaika, Jacques Boulos, B.Sc.
Daniels, Henry Ellis.	Singleton, Humphrey Gordon Holmes.
Davies, Barrie Nicholas, B.A.	Sivasubrahmanian, A., B.A.
Day, Stephen, B.Sc.	Soo, Lim Gim.
Ede, Edward Allan.	Subrahmaniam, Dhurjaty, M.A.
Edelberg, Victor.	Taggart, Reginald.
Finney, David John.	Thomas, Gilbert.
Frankland, James Edward, A.I.A.	Trash, Frederick Jesse.
Goldstein, John Daniel, A.I.A.	Turner, Helen Newton.
Grebenik, Eugene.	Vickery, C. W.
*Higginbotham, William Henry.	Walshaw, Ronald Stanley.
Hillesley, Eric George Adrian.	Weiss, Ernst, Ph.D.
Kelvin-Stark, David.	Westley, Frederick Charles.
Knop, Werner Gustav John.	Whitwell, Thomas, F.I.A.
Lengyel, Professor S. J.	Wright, Owen Archibald, B.Sc.
Lewis-Fanning, Ernest, Ph.D.	
Lim, Kai Thon, Ph.D.	

Corporate Representatives.

Cheyney, David, B.Sc.	<i>representing</i> The Jewish Health Organisation.
Heumann, Harry,	<i>representing</i> The National Federation of Building Trades Operatives.
Larkin, Sydney,	<i>representing</i> The Institute of Municipal Treasurers and Accountants.
Peyton, Sidney Augustus,	<i>representing</i> The Library, University of Reading.
Westernmann, P. H.	<i>representing</i> The International Rubber Regulation Committee.

The number of Fellows is now 1,083, compared with 1,055 † in June 1938.

* Re-election.

† Revised figure.

The ordinary Meetings have been held in each month of the Session, and the papers read and discussed before the Society were as follows :—

1938.

- I.—November 15th ... BOWLEY, PROFESSOR A. L., C.B.E., Sc.D., F.B.A.
Production and Efficiency. (Presidential Address.)

- II.—December 20th ... KENDALL, M. G., M.A. The Geographical Distribution of Crop Productivity in England.

1939.

- III.—January 17th ... CRUMP, NORMAN. The Economics of the Third Reich.

- IV.—February 21st ... LEAK, H. The Carrying Trade of British Shipping.

- V.—March 21st ... GREENWOOD, PROFESSOR M., D.Sc., F.R.S. A Statistical Study of University Education.

- VI.—April 18th ... Discussion on Juvenile Delinquency, opened by E. C. RHODES, D.Sc.

- VII.—May 16th ... Discussion on The Capital Market To-Day, opened by A. P. L. GORDON.

- VIII.—June 20th ... WISHART, JOHN, D.Sc. Some Aspects of the Teaching of Statistics.

Three ordinary meetings of the Industrial and Agricultural Research Section were held during the Session, when the following papers were read and discussed :—

1938.

- I.—November 24th ... WISHART, JOHN, D.Sc. The Statistical Treatment of Animal Experiments.

1939.

- II.—January 26th ... NEWLAND, W. F., and NEAL, E. E. Statistical Control of the Quality of Telephone Service.

- III.—May 25th ... COCHRAN, W. G. Long Term Agricultural Experiments.

In addition to this programme, fresh ground was broken by holding two evening works meetings near London and a meeting at Leeds. The first of these meetings took place on December 15th at Wembley by invitation of the General Electric Company, Limited, the second on March 30th at Greenford by invitation of the Rockware Glass Syndicate, Limited. On both occasions a tour of the works was followed by refreshments and a discussion of the statistical aspects of some of the sampling and testing problems met in the course of manufacture. The meeting at Leeds was arranged in co-operation with Mr. B. H. Wilsdon, of the Wool Industries Research Association, and was held at the University. It is hoped to form a local group of the Industrial and Agricultural Research Section, which will hold its own meetings at Leeds.

Professor E. S. Pearson has been elected Chairman of the Section Committee and Dr. J. O. Irwin Honorary Secretary.

During the session 1938–39, the Study Group, under the Chairmanship of Mr. A. M. Southall, held nine meetings, and the papers read and discussed were as follows :—

1938.			
October 18th	...	SOUTHALL, A. M.	The Future Work of the Group : Opening Address of the Chairman.
November 8th	...	BROSTER, E. J.	Some Factors in the Demand for Tea.
December 13th	...	LITTLE, LEO T.	Some Economic Aspects of Insurance (Joint Meeting with the Institute of Actuaries Students Society, at Staple Inn Hall).
1939.			
January 10th	...	WEISS, E. D., Ph.D.	Statistics of Air Transport.
February 17th	...	WHITE, PAUL.	The Biological Estimation of Vitamins.
March 14th	...	PAINE, C. L.	The Rôle of the Rayon Industry in the Self-Sufficiency Programme of the Totalitarian States.
April 25th	...	CONRAD, MRS. K., M.B., D.P.H.	Social and Economic Conditions in Relation to Still Births and Neo-natal Mortality.
May 9th	...	RABINGTON SMITH, B.	Certainty and Guesswork.
June 13th	...	HEY, G. B.	Computing.

In the year ended May 31st, 1939, 1,750 works were added to the Library compared with 1,216 the year before. These figures exclude periodicals regularly received and a number of Parliamentary Papers. During the same period 1,717 volumes were borrowed by 786 Fellows, against 1,685 by 774 Fellows the year before. It is worthy of record that an increasing use of the Reading Room was made during 1938–39 by Fellows and by other readers with cards of admission.

The Council have awarded a Guy Medal in Silver to Dr. Leon Isserlis for his paper "Tramp Shipping, 'Cargoes and Freights,'" read before the Society in December 1937, and published in Part I of the *Journal* for 1938.

The Council record with pleasure the election of the President to an Honorary Fellowship of Trinity College, Cambridge, the award of the Bisset-Hawkins Gold Medal of the Royal College of Physicians to Professor Greenwood, and the award, on the recommendation of the Royal Society, of a Royal Medal to Professor R. A. Fisher for his services to statistical science.

The list of Birthday Honours included the names of three Fellows: Sir Frederick Marquis, who was created a peer, and Mr. Herbert G. Williams, M.P., and Mr. Andrew G. Clow, C.S.I., C.I.E., who received Knighthoods.

The Council have been associated with the Royal Society in the

preparation of lists of Fellows qualified to undertake scientific research of a statistical nature and to carry out other statistical work.

The abstract of the Treasurer's Accounts, viz., a Statement of Income and Expenditure for the year 1938 and the Balance Sheet as at December 31st, 1938, together with the report of the Auditors thereon, are given in Appendices A and B respectively.

The Statement of Income and Expenditure replaces the former Receipts and Payments Account. The latter, as its name implies, merely recorded the actual cash received and the actual cash payments made during any year, whether these related to previous years, to the current year, or to the future, with the result that it rarely gave a satisfactory picture of the results of the Society's transactions. The Council, therefore, on the recommendation of the Treasurer, decided that the form in which the Society's accounts are presented to the Fellows should be revised, and on its invitation the Right Hon. Lord Plender, G.B.E., who has been a Fellow of the Society since 1901, has suggested a form of Accounts which has been adopted for the transactions of the year 1938 and also for the comparative figures in regard to the year 1937. The Council has expressed to Lord Plender its high appreciation of the services thus rendered to the Society.

The Statement of Income and Expenditure shows an excess of Income over Expenditure of £128 os. 3d. in 1938, as compared with a deficiency (on the revised basis) of £68 17s. 2d. in 1937. This represents an improvement of £196 17s. 5d. and is accounted for by an increase of £374 1s. 10d. in Income, less an increase of £177 4s. 5d. in Expenditure. The increase in Income includes an increase of £348 9s. 6d. in the sales of the Society's publications, largely but not entirely due to the increase in the sale price of the *Journal*, while the increase in Expenditure includes an increase of £120 3s. 7d. in the cost of the *Journal* and *Supplement* and a net increase of £56 10s. 8d. in Salaries, Wages, Pension, and Allowance, largely owing to the retirement of Mr. Mackenzie on pension.

The Bye-Laws of the Society are to-day substantially in the same form in which they were drafted over a hundred years ago. The Council have, therefore, had under prolonged consideration the amending of certain of those Bye-Laws where the old formalities had fallen into desuetude owing to their incompatibility with modern conditions, or where it appeared to them to be desirable to secure greater clarity and simplicity. The most important of these amendments is that to Bye-Law 17, where it is proposed that a professional auditor shall be appointed to examine the accounts of the Society in conjunction with two Fellows, one representing the Council and the other the general body of the Society. Recent experience

has shown that the traditional system of appointing honorary auditors has worked with increasing difficulty, since only a relatively small number of qualified Fellows have been able to spare the considerable amount of time required for the work. The Council are glad to be able to report that Lord Plender has expressed his willingness to act as Auditor of the Society.

The proposed amendments to the Bye-Laws are as follows :—

1. *That Bye-Law No. 4 be amended to read as follows :—*

Proposal of Fellows.

4. Every Candidate for admission as a Fellow of the Society shall be proposed by two or more Fellows, who shall certify from their personal knowledge of him or of his works that he is a fit person to be admitted a Fellow of the Society. Every such proposal shall be submitted to a meeting of the Council, and, if it is approved, a vote shall be taken at the next following Ordinary Meeting of the Society as to the admission of the Candidate. A Candidate who is apparently suitable for election as a Fellow but who has failed to find proposers qualified by personal knowledge may, with the approval of the Council, be proposed by the Honorary Officers of the Society.

Any body or institution approved by the Council may associate itself with the work of the Society by nominating one or more persons to represent it but any such persons shall be subject to election as Fellows as provided in this Bye-Law. Such persons may, with the approval of the Council, be proposed by the Honorary Officers of the Society.

2. That the foot-note to *Bye-Law No. 4* be deleted.
3. *That Bye-Law No. 9 be amended to read as follows :—*

Defaulters. Withdrawal of Fellows.

9. All yearly payments are due in advance on the 1st of January, and if any Fellow of the Society has not paid his subscription before the 1st of July of the same year, application for it shall be made in writing by the Secretaries, and if the subscription is still unpaid at the end of that year the Fellow in arrear shall cease to receive the Society's publications and shall not be entitled to any of the other privileges of the Society until such arrears are paid.

The names of all Fellows who are more than two years in arrear shall be specially reported to the Council before the next Annual General Meeting, and the Council shall then remove the names of such defaulters from the list of Fellows unless on special considerations being brought to their notice

in respect of any such defaulter they resolve that his name shall be retained on the list. No Fellow can withdraw his name from the list of Fellows unless all arrears be paid and no resignation shall be deemed valid unless a written notice thereof be communicated to the Secretaries. No Fellow shall be entitled to vote at any Meeting of the Society until he shall have paid his subscription for the current year.

4. *That in Bye-Law No. 14* the words “ whose residence is known to be within the limits of the Metropolitan post ” be deleted and the words “ whose address is in Great Britain, Northern Ireland, or Eire ” inserted in lieu thereof.

5. *That Bye-Law No. 17* be amended to read as follows :—

Auditors.

17. At the Annual General Meeting of each year, the Fellows shall elect an Auditor of the Society, who shall be a member of a body of Accountants recognised by statute, and shall determine his remuneration. They shall also elect two Honorary Auditors, of whom one shall be a member of the Council and the other a Fellow who is not a member of the Council. The Auditor of the Society and the Honorary Auditors shall hold office until the next Annual General Meeting; they shall audit the Treasurer's Accounts and shall make a report to the Fellows on the Accounts laid before the Annual General Meeting during their term of office.

6. *That in Bye-Law No. 19* the words “ that the Auditors' Report shall be presented at an Ordinary Meeting not later than March, and ” be deleted.

7. *That in Bye-Law No. 20*, the first sentence be amended to read as follows :—

Business of Annual General Meeting.

20. The business of the Annual General Meeting shall be to receive a report from the Council and the abstract of the Treasurer's accounts, to discuss questions on the Bye-Laws and management of the Society, and to elect the President, Council, and Officers for the ensuing year.

8. That the following paragraph be added to *Bye-Law No. 23* :—

An abstract of the Treasurer's Accounts, together with the report of the Auditor of the Society and the Honorary Auditors thereon, shall be printed and shall be sent with the notice of the Annual General Meeting to every Fellow whose address is in Great Britain, Northern Ireland, or Eire.

9. *That Bye-Law No. 31* be amended to read as follows :—

31. All communications to the Society printed in the Society's Journal or other publications and copyright in the same are the property of the Society, unless the Council allow the right of property to be specially reserved by the contributor.

The Fellows named below (nominated in accordance with Bye-law 14) are recommended for election as President, Council, and Officers of the Society for the Session 1939–40 :—

President

Professor A. L. Bowley, C.B.E., Sc.D., F.B.A.

Council

Sir Percy Ashley, K.B.E., C.B.	A. Bradford Hill, D.Sc.
*M. S. Bartlett, D.Sc.,	J. O. Irwin, Sc.D., D.Sc.
W. A. Basham, O.B.E.	Leon Isserlis, D.Sc.
A. M. Carr-Saunders.	*H. Leak.
Major P. Granville Edge, O.B.E.	H. W. Macrosty, O.B.E.
*Sir W. Palin Elderton, C.B.E., F.I.A.	Professor Egon S. Pearson, D.Sc.
Barnard Ellinger, C.B.E.	George Rae, D.Sc.
Dorothy P. Etlinger.	E. C. Ramsbottom, O.B.E.
*C. O. George, Ph.D.	E. C. Rhodes, D.Sc.
R. F. George.	E. C. Snow, C.B.E., D.Sc.
Sir Gwilym Gibbon, C.B., D.Sc.	J. Calvert Spensley, O.B.E.
R. G. Glenday, M.C.	Percy Stocks, M.D.
*Noel F. Hall.	*Sir Sylvanus Vivian, C.B.
R. G. Hawtrey, F.B.A.	A. D. Webb, C.B.E.
*David Heron, D.Sc.	John Wishart, D.Sc.

Those marked * were not Members of Council during the preceding Session.

Honorary Treasurer

David Heron, D.Sc.

Honorary Secretaries

H. W. Macrosty, O.B.E. E. C. Snow, C.B.E., D.Sc.
Leon Isserlis, D.Sc.

Honorary Foreign Secretary

E. C. Snow, C.B.E., D.Sc.

Signed on behalf of the Council,

ARTHUR L. BOWLEY,

President.

H. W. MACROSTY, }
E. C. SNOW, } *Hon. Secretaries.*
L. ISSERLIS, }

June 20th, 1939.

1937.			1938.	
s. d.	£ s. d.		£ s. d.	£ s. d.
380 0 0		Rent		380 0 0
136 9 7		House Expenses		132 13 4
1,022 0 8		Salaries and Wages		924 8 11
63 9 8		Pension and Allowance		217 12 1
		Meetings :—		
133 9 6		Ordinary and General	128 17 4	
45 12 1		Research Section	49 13 2	
2 11 4		Study Group	3 14 5	
	181 12 11		-----	182 4 11
		Publication and Distribution Expenses :—		
789 7 3		Journal and Reprints	971 17 4	
233 0 5		Supplement	170 13 11	
	1,022 7 8		-----	1,142 11 3
		Library :—		
63 16 0		Books	52 7 5	
86 11 8		Binding	100 12 6	
	150 7 8		-----	152 19 11
11 11 3		Furniture and Office Equipment		15 13 1
23 3 6		Insurance		20 13 7
		Stationery and Miscellaneous		
140 6 7		Printing		129 9 8
55 19 7		Postage and Telephone		69 2 6
—		Guy Medals		4 5 0
11 8 7		Miscellaneous Items		4 7 10
	3,198 17 8			3,376 2 1
		Balance carried to Accumulated Fund: Excess of Income over Expenditure for the year		128 0 3
	3,130 0 6			3,504 2 4
		Amount carried to Life Composition Fund		105 0 0
	£3,222 8 6			£3,609 2 4

DIX A.

FOR THE YEAR ENDED DECEMBER 31ST, 1938.

INCOME.												
1937.						1938.						
£	s.	d.	£	s.	d.		£	s.	d.	£	s.	d.
						Annual Subscriptions :—						
1,552 19 0						In respect of current year ...						1,614 18 0
151 4 0						Arrears						107 2 0
<hr/>												<hr/>
1,704 3 0												1,722 0 0
11 10 0						Study Group Subscriptions ...						3 0 0
10 10 0						Special Subscription and Dona- tion						20 10 0
7, 7 13 11						Sales of Journal						1,013 11 10
11 8 6						Sales of Journal Reprints ...						77 16 4
19 16 0						Journal Advertisements ...						16 12 6
102 6 6						Sales of Supplements						150 0 9
2 12 9						Sales of other Publications ...						2 2 3
50 0 0						Contribution from Royal Econo- mic Society						50 0 0
439 8 7						Dividends and Interest (gross)						447 14 11
11 3						Miscellaneous Items						13 9
3,130 0 6												3,504 2 4
92 8 0						Life Compositions						105 0 0
£3,222 8 6												£3,609 2 4

Note.—No value is placed in the Books on (1) Journals and other Publications in stock, (2) Books in Library, and (3) Pictures, Furniture and Equipment.

DIX B

DECEMBER 31st, 1938.

1937.						ASSETS.						1938.							
£	s.	d.	£	s.	d.		£	s.	d.	£	s.	d.	£	s.	d.				
Investments, at cost or under:—																			
£10,527 12s. 3d. 2½% Consols						(Guy Bequest)						5,580 0 0							
5,580 0 0						£2,336 11s. 3d. 2½% Consols						1,185 0 0							
1,185 0 0						£1,841 3¼% Conversion Loan						1,299 0 0							
1,299 0 0						£500 3½% War Loan						490 0 0							
490 0 0						£1,169 17s. 6d. 3% Local Loans Stock						800 0 0							
800 0 0						£666 4% 2nd Prefd. Stock, London and North-Eastern Railway						100 0 0							
100 0 0						£266 5% Prefd. Ord. Stock, London and North-Eastern Railway						25 0 0							
25 0 0																			
9,479 0 0												9,479 0 0							
(Market value, December 31st, 1938, less Interest accrued, £12,265)																			
Interest accrued on Investments (gross)																101 19 9			
7 1 11						Cash at Bank and in hand						49 2 11							
84 0 0						Arrears of Subscriptions recoverable						84 0 0							
6 12 7						Sundry Debtors						87 9 7							
9,576 14 6												9,801 12 3							
Building Fund:—																			
£936 0s. 10d. 3½% Conversion Loan						850 5 8													
727 16 5						(Market value, December 31st, 1938, £924)													
92 1 9						Cash at Bank on Current Account						—							
819 18 2												850 5 8							
Frances Wood Memorial Fund:—																			
£600 4% Preference Stock, London, Midland and Scottish Railway						300 0 0													
300 0 0						(Market value, December 31st, 1938, £300)													
31 15 2						Post Office Savings Bank Deposit						56 9 10							
331 15 2												356 9 10							
£10,728 7 10												£11,008 7 9							

REPORT OF THE AUDITORS.

"We have examined the foregoing Statement of Income and Expenditure and Balance Sheet with the Books and Vouchers of the Society. We have verified the Investments and Cash appearing in the Balance Sheet. We report that the above Balance Sheet is, in our opinion, properly drawn up so as to exhibit a true and correct view of the state of the affairs of the Society, according to the best of our information and the explanations given to us, and as shown by the Books of the Society.

H. C. CRAFT
R. F. GEORGE
A. M. SOUTHALL } Auditors.

PROCEEDINGS OF THE ONE HUNDRED AND FIFTH ANNUAL GENERAL MEETING OF THE ROYAL STATISTICAL SOCIETY HELD IN THE HALL OF THE ROYAL SOCIETY OF ARTS ON TUESDAY, JUNE 20TH, 1939.

The Chair was taken by the President, Professor A. L. BOWLEY, C.B.E., Sc.D., F.B.A., at 5.0 p.m.

The PRESIDENT, in opening the Proceedings, expressed his regret, which he felt sure would be shared by all present, at the absence of the Senior Honorary Secretary, Mr. Macrosty, who had been ill, but was now, happily, making a good recovery. He proposed, and the meeting cordially agreed, that a message of sympathy and good wishes be sent to Mr. Macrosty.

The HONORARY SECRETARY moved the adoption of the Report and Accounts. He said that the Report followed the usual lines to a large extent, and he would make few comments. The Council deeply regretted to report the death of the Honorary Treasurer, Mr. Waterlow King, which took place in December. They had appointed Dr. David Heron to act in his place for the remainder of the past session, and the meeting would shortly have the opportunity of formally electing him as Honorary Treasurer in the ballot for the election of the Council and Officers for the ensuing year. In the meantime, Dr. Heron's colleagues desired to express to him their great appreciation of the work he had done during the past six months, especially in connexion with the amendment of the Bye-laws.

Returning to the Report, it was satisfactory to note that the number of Fellows on the roll had increased from 1063 at December 31st, 1937, to 1083 at December 31st, 1938. He would also like to draw attention to the fact that during the session the Industrial and Agricultural Research Section had developed in a new direction by holding two evening meetings at works; they also had held a meeting at Leeds and it was hoped that in due course a branch of the Section would be organized in the Yorkshire area.

He would leave any comment on the financial statement to Dr. Heron. It had been recognized that the Research Section in its early years would be a liability to the Society, but he was glad to say that it had now almost become an asset. The meetings of the Section cost £49 as against £45 the previous year, and the printing of the Supplement cost £170 as against £233. On the other hand, the sale of the Supplements produced £150 as against £102. The progress of the Section was a matter of gratification to them all.

SIR PERCY ASHLEY seconded the adoption of the Report.

DR. HERON called attention to a statement in the Report of the Council which dealt with the Accounts of the year. Lord Plender had suggested a new form of accounts which had been adopted for the Transactions of the year 1938 and also for the comparative figures for 1937. The statement of Income and Expenditure showed an excess of income amounting to £196. This was accounted for by an increase of £374 in income, less an increased expenditure of £177.

The PRESIDENT said that he was gratified to learn on the previous day that there had been two elections from the Council and officers to the International Institute of Statistics, namely, Dr. Snow and Mr. Carr-Saunders.

The Report and Accounts were adopted.

A ballot then took place for the election of President, Council and officers for the year 1939-40, and it was later reported that all the Fellows recommended by the Council for these offices had been duly elected.

The PRESIDENT requested Dr. Heron to give the meeting some information respecting the Amendments of the Bye-laws, on which votes were to be taken.

DR. HERON said that, as stated in the Report of the Council, the Bye-Laws were substantially in the form in which they were drafted over a hundred years ago. Some of them required clarification, some did not fit in with modern conditions, and in others certain alterations had been found necessary. The proposed amendment to Bye law No. 4 did not introduce any new principle; it merely clarified the present Bye-law. The amendment to Bye-law No. 9 brought it into line with the present practice of the Society and would give authority for a somewhat more sympathetic treatment of those who found themselves unable to pay their subscriptions. In Bye-law 14 the rule that notice should be sent only to those whose residences were "within the limits of the metropolitan post" had long been obsolete. In Bye-law 17 it was proposed to provide for the appointment of a professional auditor to carry out the audit of the accounts in conjunction with two Fellows acting as honorary auditors. Experience had shown that the traditional method of entrusting this duty solely to honorary auditors had worked with increasing difficulty, as comparatively few Fellows were able to give the necessary time to the work. The amendment provided that the auditor of the Society must be a chartered or incorporated accountant, but it had been pointed out that these were not the only bodies of accountants which had received statutory recognition and therefore he asked permission to substitute for those words the following, "who shall be a member of a body of accountants recognized by

statute." The Society was to be congratulated on the fact that Lord Plender had expressed his willingness, if elected, to act as professional auditor.

With regard to Bye-law 19, the words were deleted on account of the inconvenience of the date. Under the proposed amendments in Articles 20 and 23 the accounts would be sent to Fellows in adequate time for consideration. The proposed amendment to Bye-law 31 made clearer and more defined the Society's rights in printed communications and copyright. He formally moved that the amendments to Bye-laws proposed by the Council be approved.

DR. ISSERLIS seconded the motion.

The amendments were put one by one, and all were carried unanimously. In the amendment to Bye-law No. 17 where the words "who shall be a member of a body of accountants recognized by statute" were substituted for "who shall be a Chartered or Incorporated Accountant," as proposed by Dr. Heron.

The list of defaulters was laid on the table.

DR. UNDERWOOD, on behalf of the general body of members, proposed a vote of thanks to the Council for its work during the past year. He said that the Council was a body of experts, meeting frequently and undertaking very important work on behalf of the Society. It was no small matter that they had succeeded in wakening the Bye-laws from their hundred years' sleep. He also expressed the gratification of the members at the progress of the Research Section.

The vote of thanks was seconded and carried with acclamation, and the PRESIDENT expressed thanks on behalf of his fellow officers and members of Council.

DR. HERON said that the amendments to the Bye-laws having now become effective it remained for the meeting to appoint an Auditor of the Society and two Honorary Auditors. He moved that the Right Hon. Lord Plender be appointed Auditor. It was unnecessary to say anything about him except that the Society was most fortunate in his willingness to serve in that capacity. He also proposed that Mr. R. F. George and Mr. H. C. Craft be appointed Honorary Auditors.

DR. JOHN WISHART seconded the motion, which was then carried unanimously.

The CHAIRMAN presented to Dr. Leon Isserlis the Guy Medal in silver previously awarded to him for his paper entitled "Tramp Shipping, Cargoes and Freights," read before the Society last December, and for his many services to the cause of statistics.

The meeting then adjourned for the Ordinary Meeting.

REVIEWS OF STATISTICAL AND ECONOMIC BOOKS

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	PAGE		PAGE
1.— <i>Hawtrey (R. G.). The Gold Standard in Theory and Practice</i>	595	7.— <i>Ford (P.). Incomes, Means Tests and Personal Responsibility</i>	603
2.— <i>Kalcki (M.). Essays in the Theory of Economic Fluctuations</i>	596	8.— <i>Stuart-Williams (Sir Charles) and Short (Ernest). Railways, Roads and the Public</i> ...	604
3.— <i>Kock (M. H. de). Central Banking</i>	599	9.— <i>Biljoen (F. J. van). State Interference in South Africa</i>	605
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1. *The Gold Standard in Theory and Practice.* By R. G. Hawtrey. 4th edition. London: Longmans, 1939. 7½" × 5". x + 315 pp. 7s. 6d.

Dr. Hawtrey's well-known book is based on lectures delivered in 1926 and, as successive editions deservedly followed, subsequent events and topics were dealt with in additional chapters. In this new edition, the author says in his preface, "the book as a whole has been brought up to date both in the narrative of events and in the illustrative references and allusions, and the new material and the old have been welded together. The whole has been revised in detail, and a number of passages have been rewritten with a view to greater lucidity or completeness." It may surprise many to read that "in fact the old gold standard, far from being a mere memory of a bygone phase, is a matter of present and practical concern" (p. 265), but it is undoubtedly true. That being so, study of the subject is demanded, and a careful re-reading confirms one in the opinion that this book is probably the best for those not professionally concerned with finance, and that it will be of considerable service even to the professional "expert." The two opening chapters deal with the gold standard theoretically, first from the national and then from the international point of view. The four following chapters sketch the history of its working from 1717 to 1939, and a more abstract treatment is resumed, though with practical applications, in the last two chapters, "Off Gold" and "A Stable Gold Standard." An appendix gives particulars of the gold holdings of the chief countries from 1920 to 1932. There will, of course, be a good deal of difference of opinion as to the interpretation of events and as to the author's critical comment on them. One point may be selected.

After referring to the high prices of May, 1920, Dr. Hawtrey says : " There followed a violent contraction of credit in the United States, which reduced prices by more than 40 per cent in twelve months " (p. 112), and on p. 216 he adds that it " imposed a similar deflation on all countries which were guided in their monetary policy by the gold value of their currency units." But it is relevant to observe that the monetary position at that date was unnatural and overstrained, that everybody was nervous, and that a " consumers' strike " had already begun in the United States; with or without official action collapse was certain. One would also have liked to see some discussion of the effects of the armaments programme on prices and the gold standard, as an example, though perhaps a bad one, of the revivifying effects of " a public works policy," but perhaps that was impossible considering Dr. Hawtrey's official position.

The last two chapters contain much discussion of the reports of the Gold Delegation of 1929 and the Economic Conference of 1933. Dr. Hawtrey holds that in a stable monetary system the wage level should be the " fixed point," the price of ordinary labour being stabilized, so that the progressive improvement in the position of working people would take the form not of rising money wages but of falling prices (p. 282). The Central Bank in each country should regulate the supply of money in such a way as to maintain a relative, not an adamant, stability of prices, allowing for reductions owing to improved processes and increases due to scarcity of raw materials. To fill in the details omitted in these two sentences the chapters themselves must be read.

H. W. M.

2.—*Essays in the Theory of Economic Fluctuations*. By M. Kalecki. London: Allen and Unwin, 1939. 7 $\frac{1}{4}$ " \times 4 $\frac{3}{4}$ ". 154 pp. 6s.

In this small book Dr. Kalecki presents a simplified but complete theory of the trade cycle. His conclusions are worth quoting, if only because so many trade cycle theorists tend to lose sight of the essential fact that the rationale of investment is the production of more abundant or cheaper consumption goods and services. " We see that the question, What causes periodical crises? could be answered shortly: the fact that investment is not only produced but producing. . . . The tragedy of investment is that it causes crises because it is useful." The author thus belongs to the growing body of economists who see the trade cycle as inherent in the capitalist system and the devastations of the slump as the price of progress.

The book consists of six essays, the first five of which deal with particular aspects of the capitalist economy and provide the basis of the assumptions made in the final essay, where a complete theory of the trade cycle is unfolded. The first is devoted largely to an explanation of the long- and short-term stability of the share of manual labour in the national income of both Great Britain and the United States. It is argued that labour has maintained its share since 1913 in face of the growing claim of the " capitalists " consequent upon an increased degree of monopoly, only because raw material suppliers have accepted lower prices—an argument which fits the facts fairly

well for the post-war period to 1935 but less well for the pre-war years. The author rejects the orthodox rising cost curve in favour of a horizontal average cost curve for the prime factors until production reaches practical capacity, and argues also that the cost of living varies closely with the price of a unit of output. From these assumptions it is not difficult to establish in the third essay that in a trendless economy real wage rates tend to be constant, so that the full force of fluctuations in output is borne by employment (*i.e.* the number of employed workers \times hours of work).

The second essay develops Mr. Keynes' theory of Investment and Saving and discusses that most overworked concept, the Multiplier. The author asserts the essential equality of Saving and Investment, but the argument could be strengthened by showing more clearly that Investment as well as Saving can be involuntary *i.e.*, an increase in stocks due to consumption falling short of anticipations *is* an increase of investment although the outcome will differ from the active investment in a capital asset. The Multiplier follows naturally from the assumption that manual workers do not save but do participate in any increase in the national income. By introducing an appropriate time lag between investment and the consequent changes in the national income, the author demonstrates the plausibility of his theory from the 1919-1935 history of the United States.

The fourth and fifth essays do not maintain altogether the standard of the preceding sections. The first deals with the factors which determine the investment decisions of any entrepreneur and show how an expansion of operations becomes dependent upon increasing profitability owing to the necessity to call upon outside finance. Unfortunately, the author does not follow up one interesting train of thought — whether the entrepreneur seeks to maximize total profits or profits per unit of operations. Under free competition the latter probably predominates, but, in a monopolistic world, the tendency seems towards the former.

The fifth section, which seeks to explain the stability of the long-term rate of interest, is notable chiefly for a table showing the "cyclical" stability of the yield on Old Consols from 1853 to 1932 — a table which is more interesting than relevant. In fact, the relevant rates of interest (*i.e.*, the yields on corporate debentures, preference and ordinary shares) do fluctuate widely during the trade cycle, not only in relation to the "pure" long-term interest rate, but also in relation to one another, and these variations within the interest rate structure are of considerable importance. However, the assumption that fluctuations in the long-term rates of interest can be neglected is justified on other grounds. In particular, an increasing amount of investment is being made irrespective of the prevailing rates of interest, *e.g.*, the capital expenditures of essential public services and the investment of savings of companies. Since the Stock Exchange has become mainly the mechanism for transferring the ownership of existing and producing capital assets rather than the means of financing new enterprise, the latter depends upon existing firms or private fortunes, whilst the total amount of new capital

issues made through the Stock Exchange reflects principally those factors which determine market sentiment rather than interest rates. On the other hand, the prevailing interest rates do exercise an undoubted influence upon the investment of new savings in existing securities.

Dr. Kalecki's theory of the trade cycle which comprises the last section of his book may be summarized briefly. The postulates are a closed system in which investment consists solely of private expenditure on fixed capital (*i.e.*, inventories are constant) and all the saving is done by entrepreneurs, a stable long-term rate of interest, and, finally, the absence of secular trend. The national income in any period is shown to depend upon investment made in the preceding period, which in turn reflects the investment decisions of an earlier period, *i.e.*, there is a double time lag between investment decisions and the changes in the national income, as the result of the time taken to construct a capital asset and the period between the receipts and expenditures of capitalists. However, investment decisions themselves are a function of the prevailing level of the national income, since entrepreneurs evaluate the future largely upon the present and the recent past. Accordingly, once investment decisions begin to increase the national income will tend to expand and will come into equilibrium only when present investment decisions are equal to those of the preceding period. But no account has yet been taken of the variations in the existing amount of capital equipment. Obviously, there corresponds to any given stock of capital equipment a certain requisite level of maintenance, whilst the actual amount provided for this purpose can exceed or fall short of this level. This fact, coupled with the "self-stimulating process" described above, can create an automatic trade cycle. In the first stages, maintenance falls short of the requisite amount, so that investment decisions increase with the resultant upward shift in the national income. After a time new investment will tend to exceed the amount of maintenance necessary, so that the stock of capital will increase; therefore the profits per unit of investment will tend to decline, with a corresponding restrictive effect upon investment decisions.

Although Dr. Kalecki's theory is very plausible, its value is limited to some extent by the strict assumptions upon which it is based. For example, the assumption of constant inventories will have a strange appearance to students of recent industrial history in the United States, where inventories have come to have an altogether disproportionate effect upon entrepreneurial decisions, whilst in retrospect the 1936-7 boom has the appearance of a vast restocking movement stimulated by steeply rising commodity prices and wages and by fears of labour troubles. The introduction of a secular trend of capital accumulation must also, of course, modify his theory substantially.

These criticisms should not detract from the stimulating and original thought which underlies these essays. It is to be hoped that Dr. Kalecki will be induced to undertake a fuller development of his theories with the modifications necessitated by their application to

actual conditions. It may seem ungracious to end on a note of criticism, especially since the author has set a good example by applying statistical verification to his theories. Unfortunately, owing to the lack of adequate statistics and to the very large magnitudes with which any students of the modern theory of the trade cycle must deal, there is a tendency to ascribe too much weight to those statistics which do exist. For example, in the second essay, Dr. Kalecki quotes figures from the United States to prove that capital and, in particular, stock exchange values do not influence the consumption of capitalists. Shopkeepers in the West End and motor-car salesmen in Hammersmith will tell a very different story.

J. E. W.

3.--*Central Banking*. By M. H. de Kock. London: P. S. King, 1939. 8½" × 5½". xiv + 354 pp. 15s.

Mr. de Kock states in his preface that existing books on central banking are either too purely descriptive or too purely theoretical or controversial, and that those which deal with the principles are concerned almost exclusively with Great Britain and the United States. He has therefore set out to provide a survey of the central banking situation in the world at large, and at the same time "to weave the evolution of the functions and principles of central banks along with the theoretical, psychological, and practical aspects of central banking into one whole" (p. xiii).

The book is a mine of information about recent legislation on the subject, particularly among the non-European countries to which central banking is something of a novelty. Each of the functions of a central bank is examined in turn, and comparisons are instituted among the measures by which the various countries have endeavoured to regulate each.

The book will be valuable as a work of reference. As an exposition of principles it suffers from the defect that it confines the several functions of the central bank too narrowly within water-tight compartments. It is not possible to consider *separately* the aspects of the central bank as custodian of reserves, lender of last resort, holder of clearing balances, and controller of credit through discount policy, open market operations, and other methods. These different functions are ultimately *all one*. The central bank is the organ for regulating the flow of money, and is given control of the supply of currency, metallic and fiduciary, to enable it to do so. Because it is the source of currency, it is the lender of last resort, and the methods of credit control are those by which it uses that position to regulate the flow of money.

Mr. de Kock has failed to bring out this unity, and it is his rather invertebrate treatment of the principles of monetary regulation that makes his book conform to the scepticism of Mr. Postmus, who, in his foreword, expresses the hope that it will "strengthen the hands of the group of economists who have been trying to point out the existence of insuperable difficulties in the way of complete control of credit by a central bank or any other authority" (p. ix). A group very helpful to central bankers who long for a quiet life,

and who would like to be rid of the responsibility of "managed money."
R. G. H.

4.—*The History and Mechanism of the Exchange Equalisation Account.* By Leonard Waight. Cambridge University Press, 1939. 8 $\frac{1}{2}$ " \times 5 $\frac{3}{4}$ ". xiv + 191 pp. 8s. 6d.

An ever-popular type of gift-toy is that which consists of a set of parts containing everything necessary to build a working model of an engine or similar mechanical contrivance. Everything is supplied—except a screw-driver to put it together. Mr. Waight seems to have extended the idea to this book on the Exchange Equalisation Account. The layman, it is suggested, will find everything he requires, from a description and history of the Account in simple and as far as possible non-technical language, to a glossary of technical terms which he may frequently consult if he discovers it in time, and appendices containing lengthy reprints of the relevant Acts of Parliament and other documents which he may possibly never look at. It is claimed that the ordinary reader will be provided with all the essentials of a working description of the Account, and nothing more will be expected from him than average intelligence.

After explaining how the Treasury controls the Account while entrusting actual operations to the Bank of England, the author provides brief but satisfying descriptions of the various markets in which operations take place, the foreign exchange market, the money market, the gold market and the Stock Exchange. Particularly useful are the detailed descriptions of imaginary exchange transactions and their ramifications and influence in the various markets and accounts. While telling the story of the Exchange Equalisation Account from its inception, Mr. Waight explains the different techniques and characteristics developed as the Account passed through its various phases, from the dollar phase to the franc phase, and then from the Tripartite Agreement to the gold phase. Stress is laid on the three main principles underlying its operations: firstly, that of ironing out "undue" fluctuations in the exchange; secondly, that of exchanging sterling for those foreign currencies only which are exchangeable on demand for gold; and, thirdly, that of insulating the credit structure by offsetting undue inflows or outflows of gold.

The author's practical experience of the foreign exchange and money markets lends particular value and interest to his descriptions of the financial mechanism and gives to the book an essentially practical character. His general attitude to the E.E.A. is on the whole appreciative rather than critical, and is summed up in his words, "a masterpiece of British improvisation."

Mr. Waight acknowledges his debt to Professor Hall's work on the same subject, which was written for a different type of reader. The present work was deliberately designed to appeal to all those, and there are undoubtedly many such, whose knowledge of foreign exchange is rusty or non-existent, yet who wish to understand the more complicated exchange technique developed since the crisis of 1931. To all these it can certainly be recommended.

It was unfortunate that the radical changes in policy which took place at the beginning of the year should occur at a moment so inopportune for the author. One may sympathise that such important changes should be announced after his book had actually gone to press, and although these have been dealt with under the heading of Addenda, one may still regret he was unable to make the necessary amendments in the body of the book, and thus still further increase its readability and value.

C. O. G.

5.—*Public and Private Property in Great Britain*. By H. Campion. Oxford University Press, 1939. 9" \times 5 $\frac{3}{4}$ ". xvii + 138 pp. 8s. 6d.

In this work the author studies the changes in the character of public and private property in Great Britain since 1913, and endeavours to measure the effects of such changes on the personal distribution of property and of incomes. If he is not entirely successful, it is perhaps because such questions could never be fully answered even if the available data were very much more precise and reliable than they actually are. On the other hand, in his more limited aim of analysing the kinds of property in private and public ownership, he attains a high degree of success. This is particularly true of his estimates of property in private hands and the total of private property in the wider sense, including property privately held.

The latter he estimates by the so-called Income (Giffen) method, but for the former he employs the estate method. Unfortunately this method is not free from defects. First of all, estate duty figures are by their nature of a more or less spasmodic character. Mr. Campion, while recognising this drawback in his latest estimates, which are for the year 1936, tries to avoid it in his earlier estimates by taking three-yearly periods. But even this is not a complete cure; his intermediate figures for 1926-28, for example, still show some of the abnormalities of the exceptional 1928 vintage year. There is the still greater problem of evasion, for which there is no satisfactory estimate. Incidentally, the author suggests that gifts *inter vivos* need not seriously affect estimates based on the multiplier, but this argument appears to assume that donors and donees are representative "lives" within their respective age-groups.

The estimates of public property are less satisfying. Here we seem to pass into the sphere of arbitrary assumption and opinion. Roads and armaments are excluded because of the difficulties involved in their valuation, while the valuation of Post Office property is based on profits—themselves based on arbitrary government action. And, finally, the huge amounts of national debt are excluded altogether, on the ground that it would give to public property a negative value! Such an omission seems indefensible in view of the author's avowed aim of tracing changes in public property and their effects on the personal distribution of incomes.

But Mr. Campion states his position clearly and always recognises the limitations of his data. His general conclusions show admirable restraint which occasionally, as in his summing up on private

property (p. 113), appears almost over-cautious. Elsewhere he gives us more precise results. Public property, on his basis, increased from 6-8 per cent. of the total property in Great Britain in 1911-13 to 8-12 per cent. in 1932-34. Given his assumptions, these figures, like his less disputable estimates of private property, offer little ground for criticism. In fact, apart from the points mentioned, Mr. Campion's study is a model of what statistical work should be, with a complete absence of unjustified claims to precision but, instead, showing an objective and vigilant examination of the data, combined with careful condensation and arrangement, and an unusual clarity and accuracy in the final presentation. C. O. G.

6.—*A Study in English Local Authority Finance*. By Joseph Sykes. London: P. S. King, 1939. $8\frac{1}{2}'' \times 5\frac{1}{2}''$. 307 pp. 12s.

The aim of this book, as the author states in his preface, is "to examine and appraise the working of the system of English Local Authority Finance during the post-war period 1919-35." He begins by making a brief historical survey in which he traces separately the growth of expenditure and the growth of revenue. Having set out the circumstances he endeavours to estimate the economic and social effects on the national income and the community of the results achieved by local government expenditure and taxation, and sums up the effects in a critical estimate. The book ends with a section entitled "Problems." Mr. Sykes discusses some of the weaknesses of administration and financing which the rapid expansion of local government activity has brought into prominence, together with the difficulties of adjusting the institutional basis to its new burdens, and he makes various suggestions for the reconstruction of local government both on the revenue and expenditure side to cope with the increasing spate of local activity that he foresees.

The first section on expenditure treats separately the various big branches of expenditure—housing, trading services, highways, education, health and so on describing briefly the legislation affecting each branch, and the activity which it evoked. Very much ground has been covered by this review, so much so indeed that the wood tends to be clouded by the trees, and events and actions of outstanding importance over the whole period are difficult to disentangle. When Mr. Sykes goes on to discuss the revenue side, he compares for the same branches as before burden on the rates, capital receipts, and other receipts, using as the basis for his remarks a comparison between the year 1919-20 (a very abnormal year of price and institutional dislocation and disturbed policy) and the later post-war period as typified by the average of the years 1920-35. This latter period is sufficiently long for an average to disguise any changes of trend and to destroy a great deal of the instructiveness of any comparison, the more so as no correction is made for changes in the value of money and the base year is by no means normal.

It is in his appraisal of the economic and social effects that Mr. Sykes is on the most controversial ground. In his view the damaging effects of local government revenue raising have to be set off against the benevolent effects of local government expenditure. The

damage is that the rich and business corporations who provide the bulk of the saving for the community, and hence the amount of capital available for productive enterprise, and hence finally the amount of new investment accruing to the nation each year, have their saving reduced by local government taxation. At the same time the amount of capital is depleted by local government borrowing, which is seen as to a certain extent competitive with private enterprise in securing a supply of finance. Thus Mr. Sykes concludes that local government activity by competition with private enterprise definitely diminished the national income over the period. It may be argued, however, that in a rich and mature economy like post-war England the difficulty is to avoid the deflationary effects of the high national propensity to save, and that the problem is to stimulate investment sufficiently to absorb the amount of saving which naturally comes into being, for if investment falls off without a decrease in the propensity to save, the national income falls, and it can only grow, other things being equal, if investment activity rises. If this is accepted, Mr. Sykes' difficulties disappear. It is no longer hard to see why the damage done to saving and the capital supply appears to have had such small adverse effects, and the local authority, as a large investor on capital account, and transformer of the potential saving of the rich into useful services, comes into its own as the good influence on the national income that all the circumstances lead us to believe it would be.

A final word must be said on arrangement. The work is divided into five sections, all of many pages, with no chapter divisions and no subheadings -except at the beginning to guide the reader. Hence one subject flows into another, clarity is lost, and it is difficult to extract the author's most useful conclusions. The work, however, contains information on a subject upon which little has been done, and is to be followed by another volume on the same ground. R. W. S.

7. *Incomes, Means Tests and Personal Responsibility.* By P. Ford. London: P. S. King, 1939. 9" x 5 $\frac{3}{4}$ ". 84 pp. 5s. od.

The many social and economic considerations involved in the question of means tests lack statistical definition to a great extent. In order to remedy this deficiency, Dr. Ford has examined nearly 8000 cases (drawn from twelve towns) supplied by the Unemployment Assistance Board. He has also used the records of Professor Bowley's investigations of 1913-14 and 1923-24 and those of the more recent social surveys of Southampton and London.

The opening chapter deals with the various influences of recent decades which have brought about the disintegration of family unity. The attitude of the State towards the family has, in part, recognized this fact and the position now is that while some of the family obligations are accepted by the State, *e.g.* benefit for dependants, others, as in the case of the means test, are enforced as a family responsibility attaching to the relatives concerned.

Dr. Ford enumerates nineteen forms of State assistance in which the means test may be employed, and points out that three main questions arise in connection with this concept. First, the "unit

of assessment" has to be determined, *i.e.* whether account should be taken of the circumstances of the individual, the relatives or the household. Secondly, there is the variation in the scale of relief according to the assessment, and, thirdly, the way in which contributions from the recipient or others towards the service rendered are to be collected. The results of a questionnaire issued to all County Boroughs show how very much the practice differs between local authorities in each of these three respects.

Dr. Ford goes further than the legal and administrative aspects by examining in detail the economic structure of the family and discussing the mutual responsibility of its individual components. It was for this purpose that he undertook a detailed investigation of a sample of records from the Unemployment Assistance Board and from social surveys. After discussing the nature of the family make-up, the author analyses the family income according to its origin. The tables given in both these respects show surprising differences between the various towns concerned. It appears, for example, that the proportion of families dependent on the wages of the head only was 32 per cent. in Southampton (1931) and 53 per cent. in London (1929-30). From these data it is possible to see how much or how little statutory liability coincides with the actual facts of mutual support.

In his concluding argument Dr. Ford presses for the co-ordination of local and central means tests and for a revision of the official idea of family responsibility. There is much inconsistency in the treatment of almost every aspect of the problem. The book provides convincing evidence that there is urgent need for an overhaul of the whole system and is an important aid to the proper understanding of the means test in practice.

R. F. G.

8.—*Railways, Roads and the Public*. By Sir Charles Stuart-Williams and Ernest Short. London: Eyre and Spottiswoode, 1939. 157 pp. 5s. *od.*

This book is written frankly from the railway stockholder's point of view, but our authors state their argument fairly, and have much knowledge of their subject. Part of their aim is to put the case for continued private operation and ownership, which they do very well, pointing to the efficiency shown by railway management during the sudden crisis of September 1938. Railways are clearly vital in the event of war; therefore they must be kept in a state of economic efficiency. Sir Charles and Mr. Short enforce their argument by quoting the disastrous experience of Mexico, of Italy before Fascism, and of Russia up to the present time.

Road transport, they contend, cannot deal with large quantities of goods or large numbers of persons. The proposed "motorways" would merely duplicate the four main lines. Of course, the chief financial trouble of our railway companies comes from the competition of road transport; one difficulty in dealing with it springs from the fact that there are 60,000 road transport undertakings. In other countries measures have been taken to check uneconomic competition, such as the special licences for long-distance hauliers (over

50 kilometres) in Germany, while Switzerland tries to see that journeys over 30 kilometres shall be performed by rail. Our authors do not mention the still more drastic measures adopted by the States of the Australian Commonwealth.

One is surprised to read that "the railways have no just complaint regarding the taxation of road hauliers and the proportion they pay towards road upkeep." Surely payment for road maintenance is not strictly "taxation"; moreover, it is paid mainly by private cars, which cause little road wear. With some inconsistency our authors go on to say that "road hauliers have the use of, say, £1,500 million worth of roadway for which they have paid nothing on capital account." From the railway point of view "C" licences are the real danger and Sir Charles suggests that they should be subject to the Traffic Commissioners and should be valid only for a given radius. "C" licence-holders use the railways "for peak traffic and broken loads," and also leave them the low-rated traffic.

Everyone can see how the road vehicle, working on "cost of service," has upset the railway goods classification which was based on "ability to pay." This classification was clearly for the benefit of the heavy basic trades. Lord Stamp has told us that during 1937 railway receipts from all classes of traffic averaged 6s. 3½d. a ton, whereas receipts from the lighter, higher-priced traffic averaged 17s. 6¾d. a ton. In the vulnerable classes the average receipt per ton-mile fell by 14 per cent. between 1929 and 1937.

No one who looked at the dividends now being paid would imagine that the actual receipts of English railways increased from £119 millions in 1913 to £170 millions in 1937. The explanation is that the wages bill has been increased by about 119 per cent.; in the first year labour received 51 per cent. of the net product, in 1936 labour's share had risen to 73 per cent. Our authors contend that Parliament, in passing the Railways Act of 1921, intended that the stockholders should get their standard revenue, now £51 millions, in an average year. Sir Charles Stuart-Williams and Mr. Short agree with most railway critics in wishing to abolish the privately-owned waggon, which they think wasteful as well as a check on the speed of freight trains, but they warn stockholders that the saving from the abolition can easily be over-estimated.

Many little-known facts will be found in this book about the special services offered by railway companies in recent years, such as railhead distribution, containers, and the speed of freight trains. Naturally our authors have much to say about stockholders and their small or non-existent dividends; they have no difficulty in refuting the allegation that railway capital has been "watered"; indeed they declare that the replacement value of our British railways would be at least 50 per cent. more than the £1,100 odd millions of their present capitalization.

J. E. A.

9. *State Interference in South Africa.* By F. J. van Biljoen, D.Comm. London: P. S. King, 1939. 8¾" × 5½". 15s.

Since the War the intrusions of different Governments in private business have been numerous and varied, but, save to some

degree in Russia, Germany, and Italy, they have not proceeded according to any definite plan or been sufficiently co-ordinated with one another. We can, therefore, welcome with some enthusiasm Dr. Biljoen's able and documented account of what has been happening in the Union of South Africa in the last quarter of a century. He is convinced that the reconciliation of private and public interests is impossible without a measure of coercion by the State, and his introductory chapter is a theoretic disquisition in support of this view. He then shows how South Africa has in the main kept free entry into business and preserved property rights, and next explains the various kinds of "Government trading" in the Union, which does not differ much from that in this country except where the State has undertaken the production of goods believed to be essential but not offering much prospect of profit (as in the Iron and Steel Corporation) or where it has sought to restrain monopolies by competition (as in the provision of cold storage). The fiscal and monetary policies of the Government, the protection of industries, the furtherance of agriculture, and the pressing of export trade are then dealt with, and an elaborate analysis is given of South African sugar economics in relation to attempts to regulate production and distribution. The Marketing Act of 1937 enabled the establishment of marketing boards in the hope of creating "an orderly and rational distributive system" so as to maintain "a proper balance between the interests of producers and consumers of farm products," previous attempts to regulate meat and livestock, dairy produce, tobacco, wheat, and maize having failed in any permanent effect.

Foreign trade policy and relations with other Dominions, wage and labour conditions, and rail and motor transport are dealt with in four chapters, and in a final chapter the author tries to pull the whole discussion together. The object of State interference is "the maximization of economic welfare," but South African policy has throughout been inconsistent; for example, the attempts to promote industrialisation by protection have been frustrated since the continuance of uneconomic units has been facilitated by the safeguarding of vested interests. Again "with the exception of sugar and dairy products no serious effort was made to reduce the volume of uneconomic exports by taking advantage of the enhanced purchasing power in the Union during the period of recovery, so that large discrepancies between inland and world prices of foodstuffs were perpetuated to the detriment of all concerned." Co-ordination of policy, higher wages to increase purchasing power, and much better nutrition of the "poor whites" and the natives are imperative. The dependence of the Union on gold mining was one reason for the Government's desire to diversify the economic structure, and it is foolish for any country to place increasing reliance on the continued profitability of its gold-mining industry. Agriculture and manufacture must, therefore, be fostered and made "*really* economic," the European population should be augmented, and the "backward sections of the nation" improved.

Decidedly, this is a book to be read.

H. W. M.

10.—*Walter Bagehot*. By William Irvine. London: Longmans, Green and Co., 1939. $8\frac{1}{2}'' \times 5\frac{1}{2}''$. 303 pp.

School prizes are seldom books one reads (unless freely chosen), but *The English Constitution* (not a free choice) in the underdone piecrust calf of scholastic honour began for the reviewer a literary friendship which forty-three years have steadily increased. Self-esteem leads all of us to suppose that books which give us pleasure will please others and to think well of any writer who seeks to make these books better known. Professor William Irvine of Stanford University, California, is a teacher of English, so that it is natural that he devotes the greater part of his book, not to those of Bagehot's works which secure him the *entrée* of the Society's Library, but to papers on literary and philosophical questions of which the great majority were written before Bagehot was forty and some (to which Professor Irvine gives far too much space) when he was under thirty. This is reasonable, because few readers are likely to need the opinion of an assistant professor of English to elucidate Bagehot's economic and constitutional writings, but many people who know the *English Constitution* and *Lombard Street* (may even have been examined on their contents) have never read, say, the essays on Milton, Macaulay, Gibbon and Scott, and have a pleasure to come which in these dark days will be worth having. Professor Irvine analyses Bagehot's work conscientiously if a little pedagogically. He shakes his professorial head over Bagehot's careless phrasing. "Without a shudder he can write: 'His range is very varied'; and he is too fond of 'ignoble' words, especially such conversational connectives as 'anyhow' and 'anyway.' . . . Such an expression as 'the sort of thing' would freeze the marrow of a really conscientious stylist."

It is all very sad. But the professor himself can write: "That kind of social intercourse which consists in uttering pleasant nonentities to innumerable strangers exhausted him completely." He can say of the *English Constitution* that it "evidently as an ultimate reward of permanent literary merit, was made a text book at Oxford and in several North American universities," and that in Bagehot's treatment of literary doctrine "there is throughout a large factor of error." So we must not be too nervous of frozen marrows, and may accept the professor's dictum that "more solemn nonsense is written about style than about almost anything else."

Professor Irvine, however, seems to the reviewer to have formed a just estimate of Bagehot's essential qualities. His comparison of Bagehot's writing to very good conversation is not new, but contains the reason of Bagehot's hold upon a particular class of readers. The reviewer would guess that his admirers are largely men and mostly men of over forty who take pleasure in books but are not interested in the minutiae of the art of letters. Professor Irvine says truly that Bagehot owed a good deal of his technique to Macaulay. But - without falling into the bad habit of sneering at Macaulay - it may be said that Bagehot had a larger mind than Macaulay, appeals more to grown-up people. Let anyone read Macaulay's essay on Milton and then Bagehot's. The authors were respectively twenty-five and thirty-three, but there is much more than

eight years of normal growth between them. One paper is a boy's, the other a man's. Bagehot did not have Macaulay's verbal memory, although in any modern sense of the term he was a much better educated man, but like Macaulay he was interested in the whole of life and took pains to be intelligible. When we are troubled and seek an hour's escape from the world as it is, a wise and witty visitor from that mid-Victorian world which is so familiar and so strange is welcome. The effect is similar to that which Horace can produce upon a minority. It is to be hoped that Professor Irvine will make new friends for a man who was as witty as Horace and even wiser.

M. G.

11.—*An Eighteenth Century Industrialist: Peter Stubs of Warrington, 1756–1806*. By T. S. Ashton. Manchester University Press, 1939. 8½" x 5½". x + 156 pp. 8s. 6d.

This book is No. XIII of the Economic History Series, issued by the University of Manchester, and its author, the President and historian of the Manchester Statistical Society, has already contributed two other volumes to the Series, *Iron and Steel in the Industrial Revolution* and *The Coal Industry of the Eighteenth Century* (with Joseph Sykes). The firm of Peter Stubs, Limited, fortunately preserved a large (though not complete) mass of the early records of the business, and from "a minor part" of these Mr. Ashton has compiled an account of the life of the founder and the early progress of the firm, which is likely to become a classic in economic history. Peter Stubs was already in business in 1777 when he manufactured files for factors who usually supplied the steel. Gradually he employed other outworkers and, preserving himself from dependence on any one principal, he widened his business through the excellence of his products and was able to pass by the middlemen to the retail tool-sellers. Seeing the difficulty of supervising many scattered units, he slowly managed to concentrate most of his workers at his headquarters at Warrington, a town admirably situated as a distributive centre. Though file-making always was his main business he became an innkeeper in 1788 and, "filemaker, maltster, brewer, seller of tools, combs, and slates, he was always being attracted to some new venture."

His relations with his workers are described in two chapters. The lot of the outworker was generally miserable, and often a man was in money fetters to a single and grasping factor to whom he continued in debt during his whole working life. Peter Stubs, however, was a more generous master than most, as the frequent appeals to him for loans show, just as later, in more prosperous years, he was ready to assist young men starting in life. Steel, the raw material, is the subject of the fourth chapter, and it is curious to observe that his inn was useful to him in his business for, among subsidiary materials, malt-dust and "barin-bottoms" (the dregs of beer barrels) were used to make a paste for preserving the files. The next two chapters deal with "the market" (extending from London to Glasgow and even abroad) and "the inn." Combinations of master file-makers and factors to maintain prices appear

to have been common. Chapter VII, on "the carriers," is one of the most important chapters; distribution was effected by waggon, by canal-barges, and by sea from Liverpool, and Mr. Ashton is justified in concluding that "the technique of transport, in the period we are concerned with, did not lag far behind the technique of manufacture; that enterprise was not lacking; and that Peter Stubs, at least, was not ill served by those who carried his goods." The importance of the inland bill, and of the practice of setting off accounts during a time when banking facilities were scanty are well brought out in the chapter on "the medium of exchange"; so, too, are the disastrous effects of the political crises of the period on business and finance.

The relations of the file-maker with his family are charmingly displayed in the last chapter, and the letters of some of his sons and daughters while at school give much pleasure. Others beside the social historian to whom the author refers will feel a melancholy interest in "the low cost of a polite education (including board) at a time when schoolmasters and mistresses had to rely entirely on fees for their income. Even at the prices of the eighteenth century, to have kept a growing child and given efficient teaching for 18 guineas a year (or, for that matter, half a year) must have meant close economy and a humble standard of comfort for both teacher and pupil."

H. W. M.

12.—Other New Publications.*

Butler (H. B.). The Economic Factor in International Affairs, Manchester University Lecture, No. XXXV, Manchester: University Press, 1939. 8½" × 5¼"; 36 pp. 1s.

[A brief summary of the economic history of the last 20 years, which should be very useful to the general reader. The author, who was formerly Director of the International Labour Office and is now Warden of Nuffield College, holds that all modern wars, whatever their pretences, arise from economic causes, and that in no other section of the industrial field have such profound and far reaching errors been committed as in the economic area. His survey provides the evidence for this and leads inevitably to the conclusion that "any reconstruction which is to have the slightest prospect of success must be raised upon a sound economic foundation." The lecture was delivered last February, and the argument was intended to apply equally to a settlement of the war and to one framed for the avoidance of war.]

Dubey (D. S.) and Agrawal (S. L.). Elementary Statistics for Indian Students. Allahabad: The Indian Press, Ltd., 1939. 8½" × 5¼". xv + 392 pp. Rs. 6.

[The first edition of this book was noticed in the *Journal* for 1936 (p. 171); the present edition has been brought up to date and considerably expanded, in order to make it more useful to students. The portion on "The Collection of Statistical Facts" now includes a brief critical consideration of Indian statistical publications. The section dealing with the treatment and interpretation of data has two additional chapters: "The Association of Attributes" and "The Wrong Interpretation of Data." A new Appendix, "The Measurement of the National Income of India," consists of a summary of the scheme recommended by the Bowley-Robertson Committee.]

* See also "Additions to the Library," p. 631.

Holgate (H. C. F.). The Contingent Liabilities of the English Commercial Banks. London: Gee & Co., 1939. 8" × 5½". viii + 77 pp. 5s.

[The author defines contingent liabilities and examines the nature of their different species, which he conceives to be imperfectly appreciated, in order to discuss their proper treatment in the published statements of the banks and the most convenient manner of securing uniformity in such treatment. The main section of the book (pp. 17-54) is divided into nine chapters. The first seven examine the separate kinds of contingent liabilities: discounting of bills; acceptances and credits; guarantees; forward exchange and contracts; guaranteed dividends *re* subsidiaries; unpaid calls on shareholdings; miscellaneous. Chapter 8 deals with the requirements of a bank's balance sheet, and in Chapter 9, on the lack of uniformity in respect to the treatment of contingent liabilities, detailed consideration is given to the different groupings or amalgamations of items adopted by different banks. In a preliminary essay on the Published Accounts of the Commercial Banks the author has tried "to show the background against which the need for clarification" of such items "can be seen in sharp relief"—this included a discussion, in which due regard is paid to the difficulties involved, of the general desire for greater uniformity and more detail in the balance sheets, which was effectively expressed in the report of the Macmillan Committee and in the paper given to the Society by Mr. Macrosty in 1927, both being used as evidence. Appendices contain the text of Section 124 of the Companies Act, 1929, relating to bank balance sheets, and reproductions of the balance sheets proposed and required in connection with the Select Committee on Joint Stock Banking, 1836, and of the latest ones issued by the Big Five.]

Tout (Herbert), M.A. The Standard of Living in Bristol (University of Bristol Social Survey). Bristol: Arrowsmith, 1938. 9" × 5½". 64 pp. 1s. net.

[This report, issued in advance of the comprehensive Survey of Bristol undertaken by the University and now practically completed, deals solely with a special enquiry into the Standard of Living of the working-class population relating to the period May-October, 1937. These results are especially interesting, in that, as Professor Hamilton Whyte points out in his Foreword, they refer to "a prosperous town at a moment of general prosperity." The enquiry was made by sample; adequate information was obtained from 92½% of the families approached and relates to 4,491 households. For the purpose of the Survey the "working classes" included, besides manual workers, "black-coated" employees earning less than £5 a week, small shop-keepers, hawkers, and others working on their own account. The "minimum needs" standard (a term preferred by the investigators to "poverty line") was fixed at a level higher than that known as the Booth-Bowley and used in the London Survey, by increasing the allowance for the food needs of children. The results showed 10.7 per cent. below this line; if the London Survey base line had been used the figure would have been 6.9 per cent. The families constituting the 10.7 per cent. contained 11.8 per cent. of the persons covered by the enquiry, and 20 per cent. of the children. This is one of the most important facts brought out in a survey of one of our most prosperous towns. It is not to be attributed to a preponderance of large families. The average family size in the poorest class is no more than 3.73 (compared with 3.94 in the most comfortable class above the line). Poverty is, however, directly related to the number of children in the family; 51.3 per cent. of families below the line have 4 or more children; 24.8 have 3. Hence "if something can be done for families with 3 or more children 76 per cent. of the child poverty will be abolished."

The report consists of valuable data well arranged and explained with admirable clarity. Appendices give the details of the needs standard used, an interpretation of the tables, a reproduction of the questionnaire, figures of gross family incomes, and a note on the reliability of the results.]

STATISTICAL NOTES

1. BRITISH OFFICIAL STATISTICS

ON page 612 we give our usual table summarizing the *oversea trade* of the United Kingdom for the years ended July 1938 and 1939. The trade of May, June and July each presented the same general features in relation to that of the corresponding month in 1938, viz. increases for imports and for exports of United Kingdom goods and a decline for re-exports. The excess of imports over exports rose by £1·2 million in May, £3·3 million in June and £2·3 million in July. These increases were small in relation to the substantial improvement in the adverse balance in the early part of the year, and for the seven months the excess of imports over exports of merchandise declined by £18·1 million to £217·1 million.

Imports in July, valued at £78,280,000, were £4,382,000 (6 per cent.) more than in July 1938. As has been the case in each month since October, the value of food, drink and tobacco imported was less than a year earlier, the decline for July being £3,396,000 (9 per cent.). The rise in imports of raw materials and manufactured articles, not so long in progress, also continued, amounting to £2,079,000 (11 per cent.) and £5,749,000 (32 per cent.) respectively. Re-exports declined from £4,555,000 to £3,725,000, the value of manufactured articles re-exported falling by nearly one half to £825,000 owing essentially to negligible purchases of non-ferrous metals by the Soviet Union.

The decline of £3,482,000 in retained imports of food, drink and tobacco was not mainly due— as it was in previous months—to a marked decline in the value of cereals, but to a fall of over £1½ million in respect of dairy produce. Imports of butter were on a much smaller scale than last year and there were also reduced imports of cheese. Average values of grain continued at low levels and the fall for wheat was so marked that the total value remained unchanged notwithstanding a rise in quantity from 9·1 to 14·0 million cwts.— a very abnormal figure. Retained imports of meat declined in value by £890,000, due to a marked reduction in imports of mutton and lamb. Imports of cocoa were exceptionally small and the value fell by over £500,000, but the value of the sugar imported rose by £762,000 though there was no change in quantity.

Movements and Classes.	Twelve Months ended July 1933	Twelve Months ended July 1932	Increase (+) or Decrease (-)			
Imports, c.i.f.—	£'000	£'000	£'000			
Food, drink and tobacco	444,778	416,458	(—) 28,320			
Raw materials and articles mainly un- manufactured	288,685	238,676	(—) 50,009			
Articles wholly or mainly manufac- tured	261,397	239,249	(—) 22,148			
Other articles	7,064	8,449	(+) 1,385			
Total Imports ...	1,001,924	902,832	(—) 99,092			
Exports, f.o.b.—						
<i>United Kingdom Produce and Manufactures —</i>						
Food, drink and tobacco	36,625	37,306	(+) 681			
Raw materials and articles mainly un- manufactured	59,060	58,211	(—) 849			
Articles wholly or mainly manufac- tured	384,564	367,947	(—) 16,617			
Other articles	12,846	13,410	(+) 564			
<i>Imported Merchandise —</i>						
Food, drink and tobacco	12,535	12,340	(—) 195			
Raw materials and articles mainly un- manufactured	29,472	29,395	(—) 77			
Articles wholly or mainly manufac- tured	22,406	13,696	(—) 8,710			
Other articles	728	642	(—) 86			
Total Exports ...	558,236	532,947	(—) 25,289			
Bullion and Specie—						
Imports	263,174	242,504	(—) 20,670			
Exports	145,802	626,912	(+) 481,110			
Movements of Shipping in the Foreign Trade—	No. of Vessels	Thous. Tons Net	No. of Vessels	Thous. Tons Net	No. of Vessels	Thous. Tons Net
<i>Entered with cargoes—</i>						
British	24,774	39,354	24,449	39,185	(—) 325	(—) 169
Foreign	27,608	30,776	25,974	29,097	(—) 1,634	(—) 1,679
Total entered ...	52,382	70,130	50,423	68,282	(—) 1,959	(—) 1,848
<i>Cleared with cargoes—</i>						
British	30,066	35,190	29,755	35,006	(—) 311	(—) 184
Foreign	22,064	24,272	22,443	25,746	(+) 379	(+) 1,474
Total cleared ...	52,130	59,462	52,198	60,752	(+) 68	(+) 1,290

Raw materials imported and retained rose in value from £17,284,000 to £19,499,000, the increase being well distributed. There were, however, considerable declines in both quantity and value for cotton and rubber. Wool showed the largest rise in value and a 50 per cent. rise in quantity, and among the other important raw materials imported in increased quantity may be mentioned wood and timber, iron ore and scrap, and wet and dry hides.

There was a rise from £16,106,000 to £22,636,000 in the value of retained imports of manufactured articles, this increase also being very widespread. The largest increase was £1,505,000 for non-ferrous metals, retained imports of copper, lead, tin, zinc and nickel all being much greater than a year earlier. Iron and steel rose by £1,170,000 from the relatively low value recorded last year. There was an increase of 12 per cent. in retained imports of refined petroleum, following a record importation in the first half of the year, and the value rose by £901,000. Other increases of major importance and significance were recorded for jute sacks and bags and machine tools.

Exports of United Kingdom goods rose by £2,885,000 to £40,355,000, most of the groups showing increases. The rise of £95,000 in respect of food, drink and tobacco was mainly due to an increase for spirits, while that for raw materials (£562,000) resulted essentially from larger exports of coal. Though the average value of the latter was 5 per cent. less than last year, the value rose by £509,000, the quantity increasing from 3,056,000 tons to 3,736,000 tons. The largest increases were 211,000 tons to Sweden, exports to which were relatively small in July last year, 136,000 tons to the Netherlands, 100,000 tons to Italy and 88,000 tons to France.

The value of manufactured goods exported rose from £28,963,000 to £30,997,000. The only substantial decline was £440,000 in respect of machinery, there being considerable reductions in exports of textile machinery, electrical machinery, and boilers and boiler house plant in particular. Iron and steel and cotton goods, which previously had declined in value, showed an appreciable increase in July. The quantity of iron and steel exported rose from 135,000 tons to 177,000 tons, the largest increases being in exports of tinned plates and uncoated plates and sheets. Exports of motor cars and chassis showed a substantial increase. There was a considerable improvement in exports of textiles, but whereas the increase previously had tended to be mainly in the semi-manufactures, there were last month larger exports of all the important classes of finished goods. The quantity of cotton piece goods exported

rose from 113 million square yards to 129 million square yards, notwithstanding a fall of 7 million square yards in exports to India. Exports to the Argentine rose by over 6 million square yards to 16.2 million square yards, which was only 237,000 square yards less than the quantity exported to India, while the value was very much greater. Increased exports to the United States contributed largely towards the improved exports of woollen and worsted tissues and linen and jute piece goods.

The calculations of the Board of Trade show that, eliminating price changes, the volume of imports in the second quarter was 7 per cent. greater than a year earlier and exports of United Kingdom goods rose by $7\frac{1}{2}$ per cent.; there was, however, a decline of 16 per cent. for re-exports. For the first quarter imports declined in volume by 3 per cent. and domestic exports rose by a similar proportion. Average values of imports and of United Kingdom exports were respectively 5 and 3 per cent. lower last quarter than a year earlier, and were about the same as in the preceding quarter.

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Exports of bullion and specie have exceeded imports throughout this year, the net outward movement during the seven months being £227 million; in the corresponding period last year imports exceeded exports by £83 million. After several months, during which exports were very heavy, the net outward movement in June was much smaller (£11.3 million), but this slackening was only temporary and in July exports exceeded imports by £31.7 million.

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Over the three months May to July, 1939, there was little change in the general level of *wholesale prices*, the Board of Trade index numbers registering only a rise of 0.9 per cent. Prices of industrial materials and manufactures advanced about $1\frac{1}{2}$ per cent. and those of food and tobacco declined about $\frac{1}{4}$ per cent. There was, however, a definite decline in cereals (about 7.4 per cent.), owing chiefly to the fall in the prices of wheat and flour, and a seasonal rise of nearly 13 per cent. in the prices of potatoes. British and Argentine beef prices rose appreciably, but those of home-bred mutton fell more than 15 per cent. The increased prices of sugar and tobacco are due to the additional duties imposed by the budget. Raw wool prices advanced rather more than 9 per cent.

Compared with July 1938, the general level of prices in July 1939, showed a fall of about $2\frac{1}{2}$ per cent., which was largely due to a decrease in wheat prices of round about 40 per cent. There were

considerable declines also in the prices of barley and maize. Only a slight drop occurred in the prices of industrial materials and manufactures in general, but iron and steel prices fell 6·8 per cent. Prices of cotton yarn and cloth showed some decline, as also did those of Egyptian raw cotton; on the other hand, American raw cotton advanced about 8 per cent. Such information as is available shows that during August wholesale prices advanced generally but, with the exception of cereals, not to any great extent.

The Board of Trade index numbers of wholesale prices for the four months, April to July, 1939, are given below :—

(Averages for the year 1930 = 100)

Date	Total Food	Total not Food	All Articles	Basic Materials	Intermediate Products	Manufactured Articles	Building Materials
April 1939	91·4	100·1	97·2	90·4	99·6	108·6	102·4
May „	91·9	100·8	97·8	92·2	101·3	108·8	103·5
June „	91·9	101·3	98·1	93·2	101·7	109·0	103·4
July „	91·2	101·7	98·1	94·3	102·0	109·1	103·3
July 1938	97·8	101·9	100·6	89·3	103·9	111·7	103·6
„ 1937	102·9	116·1	111·5	128·5	113·1	115·2	105·7
„ 1936	89·9	95·5	93·6	97·4	93·5	98·8	96·9

Prices of basic materials, which have been advancing steadily since the end of 1938, have advanced about 5½ per cent. since July, 1938, but are still over 28 per cent. below the high level reached in April 1937.

The figures of certain other British Index Numbers of wholesale prices and the official index numbers of wholesale prices in France, Germany, and the United States are given below for comparison.

Date	Board of Trade (1930 = 100)	<i>Economist</i> (1927 = 100)	<i>Statist</i> (1866-77 = 100)	<i>The Times</i> (1913 = 100)	France (<i>Stat. Générale</i>) (1929 = 100)	Germany (<i>Stat. Reichswirt.</i>) (1929 = 100)	U.S.A. (Bureau of L. & M.) (1926 = 100)
April 1939	97·2	69·2	90·5	111·1	107·7	77·6	76·0
May „	97·8	70·5	90·6	111·6	109·1	77·6	76·0
June „	98·1	69·8	90·6	113·4	108·9	77·8	75·5
July „	98·1	69·3	88·7	111·9	108·1	78·0	75·3
July 1938	100·6	72·2	91·1	115·6	104·0	77·0	78·5

Mean of weekly prices.

Over the three months May to July, 1939, there was a slight advance in the *retail prices* of articles of working-class consumption, and the Ministry of Labour's index number of the prices of such articles rose from 153 at the beginning of May to 156 at the beginning

of July. There was a recession to 155 at the beginning of August, chiefly due to a decline in the price of potatoes. During June and July potato prices vary considerably until the new season's crop has been established in the markets. There was some slight advance during the period in the prices of sugar, milk and eggs, and on the other hand some slight decline in the price of cheese. As compared with the prices ruling twelve months previously there was some decline at August 1st, 1939, in the index number for food (141 to 137), and some slight advance in the cost of rent, fuel, and miscellaneous items of expenditure, but the index number for all items shows only a fall from 156 to 155. The Ministry of Labour's index number (prices at July 1914 = 100) is given below :

	May 1st, 1939	June 1st, 1939	July 1st, 1939	Aug. 1st, 1939	Aug. 1st, 1938	Aug. 1st, 1937
Food prices ...	134	134	139	137	141	140
All items (food, clothing, rent, fuel, etc.) ...	153	153	156	155	156	155
All items a year earlier ...	156	155	159	156	155	146

It will be seen that between August 1936 and August 1939 the index number has advanced rather more than 6 per cent. (146 to 155). Food prices have advanced 6·2 per cent. and clothing 9 per cent. with smaller advances in the prices of fuel and rent.

Employment continued to improve during May, June and July, 1939, and the rate of unemployment in Great Britain and Northern Ireland in the insured trades (including agriculture) fell from 11·4 per cent. at 17th April to 8·8 per cent. at July 10th, 1939. At the middle of May the percentage had fallen to 10·4 and in June to 9·4 per cent. The improvement was fairly continuous throughout the period and in nearly all industries, although there was the usual seasonal slackness in most of the clothing trades in July. The decrease in unemployment was very appreciable in the metal trades and most of the textile industries and both groups were much better employed than in the corresponding period of 1938. There was, as usual, a high percentage of unemployment among those engaged in dock, wharf service, etc., and public works contracting (24 per cent. and 31·4 per cent. respectively in July), but apart from the more or less casual nature of the employment there must always be some doubt as to whether considerable numbers of men who register under these occupations may not be on the fringe

of employability, and this applies, no doubt, to some extent, to men registering as unskilled labourers in various other industries.

Unemployment was lowest in July, 1939, in the South-Western District (4.3 per cent.), South-Eastern (4.8 per cent.), London (6.2 per cent.), and in the Midlands (6.7 per cent.). It was highest in Northern Ireland (21.3 per cent.). In Wales it was 15.3 per cent., Northern District 13.8 per cent., North-Western District 12.3 per cent., and in Scotland 11.5 per cent.

The percentage unemployed during the period April to July, 1939, are given below :—

Date	Percentage Unemployed in Great Britain and Northern Ireland of Workpeople Insured Under				
	General Scheme	Agricultural Scheme	General and Agricultural Schemes		
			Males	Females	Total
April 17, 1939	11.6	6.1	11.9	9.8	11.4
May 16, ..	10.6	5.7	10.8	9.1	10.4
June 12, ..	9.7	4.2	10.0	7.9	9.4
July 10, ..	9.1	3.9	9.4	7.4	8.8
July 18, 1938	12.9	4.3	13.0	11.1	12.5

The total number of workpeople aged 14 to 64 (insured and uninsured) on the registers of the Employment Offices of the Ministry of Labour in Great Britain is given below for the same period. Of the total unemployed on July 10th, 1939, about 27,500 were boys and girls between 14 and 16 years of age and 29,000 between 16 and 18. Some considerable numbers of those under 16, though applicants for employment, were remaining whole time at school until they obtain employment.

Date	Wholly Unemployed	Temporarily Stopped	Persons normally in Casual Employment	Total
April 17, 1939	1,343,295	238,729	62,370	1,644,394
May 15, ..	1,234,001	198,617	59,664	1,492,282
June 12, ..	1,098,793	195,625	55,161	1,349,579
July 10, ..	1,013,636	190,364	52,424	1,256,424
July 18, 1938	1,241,461	467,773	60,882	1,773,116

Of the 1,256,424 on the registers at July 10th, 1939, 981,010 were males and 275,414 were females.

Stock Exchange Values which had declined more or less generally from November 1938 to April 1939 improved to some extent during

May, but there was a reaction in June and July owing to the continued uneasiness occasioned by the international political situation, and the index number of the *Bankers' Magazine* declined during the two last-mentioned months. It did not reach the low level of April 1939, when the index number stood at 107.1 (values at December 1921 = 100). The index number for July was 108.8, or, except for April, lower than at any date since August 1932. The index number for Fixed Interest Stocks fell to 112.5 and that for Variable Dividend securities to 100.9 or, with the exception of April 1937, lower than at any dates since June 1932 and May 1933 respectively.

The statistics of *retail sales* prepared by the Bank of England in conjunction with various retail distributors' Associations and co-operative societies show that over the period February to June 1939 the total of such sales registered an increase of 2.1 per cent. over the corresponding period in 1938. The sales of food and perishables increased 2.3 per cent. and those of other merchandise 1.8 per cent. Sales in all districts except that of Central and West End London recorded increases. The index numbers (average daily sales in 1937 = 100) were 108, 111 and 103 for April, May and June 1939 respectively.

The Bank of England in conjunction with the Wholesale Textile Association has recently commenced to publish in the *Board of Trade Journal* index numbers of *wholesale trading in textiles*. The index numbers are based on the average monthly sales (1937 = 100) and give separate figures for Home and Export Sales. The total index number for 1938 was 93 and the numbers for the first six months of 1939 were 54, 75, 116, 94, 103 and 93 respectively. The mean for the first six months of 1939 was 89 compared with 86 in the corresponding period of 1938. The total index number for July 1939 was 66 compared with 63 for July 1938.

The figures cover the turnover of practically all the important houses in the large centres of distribution.

Shipping freights, which showed some recovery in April 1939 from the fall in March, improved to a greater extent in May. There was some appreciable decline in June, with a further slight recovery in July. The index numbers of the Chamber of Shipping (average 1935 = 100) for the three months May to July 1939 were 129.6, 121.5 and 123.0 respectively. The mean number for the year 1938 was 126.9 and for the first seven months of 1939 it was 121.9. Since July there has been some considerable improvement, especially in grain freights.

2. OTHER STATISTICS

From the Birmingham Information Service on Slavonic Countries the Society has received two monographs on Poland, numbered 4 and 5 and relating respectively to National Income and Foreign Trade.

In the former, National Income is estimated for 1929 by means of a calculation of consumption expenditure plus investment. Separate estimates are made for urban and rural populations, 64 per cent. of the total population being engaged in or dependent on agriculture. Figures are given for different classes of the community and, where possible, are compared with similar figures for Great Britain; the average income per family (including all savings) in Poland is estimated to have been only 34 per cent. of the corresponding income per family in Great Britain in 1929. In order to indicate the effect of the 1931 depression on national income, estimates of real income and of money income in 1933 are compared with those for 1929. A fall of 25 per cent. is shown for the former and of 49 per cent. for the latter, the wage earner appearing to be by far the heaviest sufferer, which is stated to be quite contrary to the experience of Great Britain. For the period of recovery it is estimated that in the first quarter of 1937 real national income was 20 per cent. higher than in 1933 and that the share of national income going to the working class had increased. A series of Basic Statistics relating to Business Conditions is reproduced from tables issued by the Polish Institute of Economic Research.

The monograph on Foreign Trade is prefaced by a summary of trade policy divided into three periods, 1918-1925, 1925-1933, and 1933-1937. Special features relating to the trend of commerce in different industries are discussed and also illustrated by tables. Figures for the commerce of Danzig and Gdynia are shown separately, and comment is made on the changes in relative importance of the two ports. The direction of the total commerce of Poland during the years 1928-1938 is illustrated by a table showing the proportion of imports and exports from and to each major country compared with total imports and exports.

The Society has received Nos. 1 and 2 of the *Boletín de Estadística*, the first statistical publication of the National Government of Spain, a country which for three years past has been able to issue no official returns. The *Boletín* aims at presenting an all-round view of economic and social development, and the material includes vital statistics, production, consumption, foreign trade, transport

and communications, rates of exchange, and indices of wholesale prices and of cost of living. The preface emphasizes the importance of demographic statistics, and these, in fact, occupy the greater proportion of the space in No. 1. Unfortunately, however, they cannot be said to give adequate representation of the position. The tables showing the movement of population (July 1st, 1936, to March 31st, 1939) relate to National Spain only. For the war years the enumeration was based on the judicial districts, and only those in possession of the National Government were included in the count; thus a part of the increase is not natural, but due to accretions of territory from the Republicans. Further, migration is ignored, and only civilians are included; no figures are given of the casualties in Republican Spain. It is therefore impossible to make any estimate of the demographic effects of the civil war.

Boletín No. 2 includes a summary of foreign trade by countries, the trade with Republican Spain being separately shown. In the accompanying text such trade is apparently not taken into account; for it is stated that the value of exports to Great Britain decreased from 13.7 million gold pesetas in the first 6 months of 1936 to 7.4 million in the corresponding period of 1937. Whereas the table gives the 1937 figures as 7.4 million from National Spain, and a like amount for the exports from the Republican area. On the face of it the exact correspondence looks improbable, but the text can hardly be correct as it stands.

Allowance must be made for the difficulty of compiling statistics in a country which has only just emerged from a civil war of 32 months duration; that the effort has been made is an encouraging sign, and greater completeness and accuracy will doubtless be attained as time goes on.

CURRENT NOTES

THE latest volume of the *Transactions of the Manchester Statistical Society* contains the Report of the Council for the 105th Session, 1938-39, and the papers read at the Ordinary Meetings and Group Meetings (five of each) during that Session.

In "Wage Rates and Earnings in Cotton-Weaving," Mr. E. M. Gray examined the course of technical development from 1819 to 1937 and its effect on the relationship between rates and earnings, which is illustrated in a series of charts. His conclusion is that the relationship between wage-rates and earnings and labour costs in the bulk of the industry "seems to be anything but a healthy one", and he points to the fact that the great majority of the workers are in the lowest paid group as "the underlying cause of the frequent labour disputes . . . during the past ten years."

Professor Arnold Plant and Mr. R. F. Fowler contributed an elaborate analysis of the Costs of Retail Distribution based on data ranging over seven years' trading collected from over 100 department stores in Great Britain (31 in London) which are members of the Retail Distributors' Association. The paper is in two parts: a "static" analysis designed to show the individual firm where it stands in comparison with others at a given time, and a "dynamic" comparison of the adaptations of business activity to changing market conditions. This is effected by two methods. The first traces the relation between yearly variations in the volume of sales, the cost of goods sold and the retailing expenses as illustrated by the experience of a constant sample over seven years; in the second the stores are graded according to the rate of change of a given variable *e.g.*, stock turnover.

Dr. H. W. Singer's interesting paper on "The Inflexibility of the Price System" is described by him as "an attempt to measure the variability of individual prices within the price system and to prepare the ground for an enquiry whether the price system has become more inflexible" since the war. To this (he says in his summary) he has been able to give no clear-cut answer, although "changes have occurred which do support the opinion of increasing rigidity." The work is based on the dispersion of the price relatives of 40 commodities (out of the Board of Trade's 45) in the pre-war (1871-1913) and post-war periods (short period pre-war movements were obtained from the Sauerbeck MS. price data presented by the author to our own Society). No pains have been spared in the

investigation, and the clarity of the exposition is not the least merit of the paper.

The remaining papers are not statistical in treatment. "Central Banks and the State" is a short essay by Mr. Barrett Whale on "the question of the proper relationship between the government and the central bank"; and in "Modern Population Trends," Mr. R. F. Harrod considers "the contemporary situation as it has been painted for us by the experts . . . and its social and economic implications, both by way of cause and effect." As regards "the economic effects to be expected if the decline continues unabated" Mr. Harrod expresses his view as "wholly gloomy."

The papers read at the Group Meetings were: "The Time-Rate of Money Payment in Great Britain," by G. L. S. Shackle; "Production Trends in the United Kingdom," by E. Devons; "Employment in the United Kingdom since 1927," by W. G. Champernowne; "Trends in Internal Migration," by A. G. Cairncross; and "The Mechanics of Market Supply in Agriculture," by M. G. Kendall.

An unavoidable delay in the publication of this issue enables us to give notice of the programme of the Manchester Society for the 1939-40 session. The papers promise to be of especial interest and importance. The opening one (November 8) is by our President, Professor A. L. Bowley, who has taken as his topic "The Measurement of Real Income." The subsequent papers will be "Man Power in Agriculture" (December 13), by Mr. John Maxton, of the Oxford Institute of Agricultural Economics; "An Experiment in Tariff Making" (January 10), by Sir Percy Ashley, Chairman of the Cotton Control Board and formerly a member of the Import Duties Advisory Committee, also a Vice-President of this Society; "Economic Interference with London Transport" (February 14), by Mr. Frank Pick; and "War Finance and the Distribution of Income" (March 13), by Professor and Mrs. J. R. Hicks.

In March 1940 the Manchester Statistical Society is arranging a special meeting of persons interested in the application of statistical methods in industry. The discussion will be opened by a paper by Mr. S. Horrobin and Dr. O. L. Davies on "Statistics: a Technical Tool in the Chemical Industry," and the Chemical Societies in Manchester are co-operating in the meeting. This meeting will be part of the programme of the Group for the study of statistical methods which was started a few years ago. The Group has been

extremely successful in bringing together people engaged in statistical work in Manchester and the North of England. In recent years there has been a marked increase in the number of students taking courses in statistics at the University of Manchester, and many of these after graduation have taken an interest in the work of the Society. To satisfy the growing interest in statistics, an advanced course in statistical methods was started at the University in 1936. In the spring of 1939, by arrangement with the Manchester Statistical Society, a series of lectures on Sampling were given by Mr. H. Campion and Mr. L. H. C. Tippett. These lectures attracted persons engaged in statistical enquiries in economics, agriculture, industry, public health, psychology and education. It is hoped that it might be possible to arrange a somewhat similar course on statistical methods at the University early in 1940. Fellows of the Royal Statistical Society who might wish to attend any of these meetings of the Manchester Statistical Society should write to the Secretary, Mr. A. H. Allman, 38, Mosley Street, Manchester.

Many of the books which come to the Library are not of a statistical nature, and not a few have little connexion with economics. It is, however, always interesting to study the lives of men who make political economy and are, therefore, the causes of statistics. Prominent among such men in our time is Dr. Schacht, and students of finance will accordingly read with interest the study of "Hjalmar Schacht, Central Banker," by Karl R. Bopp, Ph.D., Associate Professor of Economics and Finance, in No. 1, Volume XIV, of "The University of Missouri Studies, a Quarterly of Research." Dr. Bopp has, on the whole, tried to be fair to his subject, but still his treatment is faintly malicious, and one may point out that the accounts, on pages 61 and 89, of Schacht's appointment to the Ministry of Industry in 1934 differ in implication. It is not our purpose to assess the merits of Dr. Schacht, but he is plainly a man of great ability and a firm believer in the doctrine that "circumstances" and persons "alter cases." He has never allowed himself to be dominated by economic theory and has always suited his actions to what he deemed to be appropriate to the economic facts of the day as he understood them. Perhaps the most ironical thing about him is that his full name is Hjalmar Horace Greeley Schacht! His father had been resident in the United States for some years before the birth of his now-famous son and had become an enthusiast for the American political system and an admirer of the great American publicist.

OBITUARY

CLÉMENT-LÉON COLSON

b. 1853; d. 1939

OUR late honorary Fellow, Monsieur C. L. Colson, was better known to those who were active in our Society at the beginning of the century than to our present leaders. His active work in statistics was, nevertheless, among the developments of his maturer years. Trained in mathematics as an engineer (in 1908 he became Inspecteur-Général des Ponts et Chaussées) his interests extended later to Political Economy, and he delivered courses of lectures on that subject at the École Polytechnique, at the École des Ponts et Chaussées, and at the École Libre des Sciences Politiques. These lectures reached a wider public in book form, the publication of the different parts extending over a prolonged term of years, during which some parts were reissued in a revised form while others were taking their first definite shape. His statistical work developed as the theoretic expression of his views took shape. Perhaps the form of his economic views was affected by his studies in statistics as much as the latter were influenced by the former. A special interest in railway statistics, not those of his own country alone, but of all countries, is not a matter for surprise in the case of such a teacher and thinker. But his interests were not concentrated on transport statistics, though his first book was one on the statistics and rate-problems of transport. He was among those who dared to attempt an estimate of French national income in the early post-war years, in the face of the exceptional difficulties presented by the special circumstances of that time. His interests and his knowledge were wide, and he was not easily satisfied with guesses to take the place of painstaking research among sources of information not readily available.

Monsieur Colson held, for some years before his death, the position of Vice-President of the French Conseil Supérieur de Statistique, of which body he became a member in 1912. It was as late as 1906 that he was elected a member of the International Statistical Institute, and the first meeting of that body at which he was present was that held at Paris in 1909. At the resumed meetings arranged after the war he was one of the leading figures, and, as chairman of the section dealing with economic statistics, at each of the first four of those meetings, *i.e.* from 1923 to 1929, contributed much, in an unobtrusive way, to the effectiveness of the discussions. Some of our Fellows will recall also his presence at the London meeting in 1934, the last which he attended.

A. W. F.

CHARLES HENRY WICKENS

b. 1872; d. 1939

The Council has to record with deep regret the news of the death of Mr. C. H. Wickens, I.S.O., F.I.A., lately Statistician and Actuary of the Australian Commonwealth, and a Fellow of the Society since 1918.

Mr. Wickens, son of Charles Wickens of Newbury, Berks., was born at Lockwood, near Bendigo, Victoria, on October 16, 1872. At the age of 25 he entered the service of the Western Australian Government as statistical compiler and actuary. In 1905 he was awarded the Messenger Prize by the Institute of Actuaries, and the next year, on the establishment of the Commonwealth Bureau of Census and Statistics, he transferred to that office under Mr. (afterwards Sir George) Knibbs, at whose death in 1922 he succeeded to the post of Commonwealth Statistician, a title expanded in 1924 to that of Statistician and Actuary. As such, he was in charge of the Australian censuses of 1911 and 1921 and also of the census of wealth taken in 1915.

During his term of office Mr. Wickens constructed the Australian mortality tables covering the period 1881-1922, the only ones in existence for that period. He was also chiefly responsible for the development of the *Commonwealth Year Book*, and soon after his appointment he succeeded in establishing regular conferences between the statisticians of the several states, thereby effecting the co-ordination of statistics throughout the Commonwealth an achievement witnessing to his tact no less than to his ability. Mr. Wickens represented his Government at the Labour Conference held in Geneva in 1927 and also at the 8th International Actuarial Congress which met in London that year. In addition to the performance of his strenuous official duties, he was called upon as an expert to give evidence before almost every Royal Commission set up to deal with economic or financial matters from the time of his appointment down to 1931, in which year his health suffered a complete breakdown from which he never recovered.

Besides the publications for which he was officially responsible, Mr. Wickens collaborated in an enquiry into the Australian Tariff and contributed to a number of periodicals, notably the *Journal of the Institute of Actuaries* and the *Australian Economic Record*. As lately as 1930 a paper by him on Australian Mortality was read before the Institute of Actuaries. That, owing to his unsparing industry, his work should have been cut short at the zenith of his mental powers must be regarded as a profound misfortune.

STATISTICAL AND ECONOMIC ARTICLES IN RECENT PERIODICALS

UNITED KINGDOM—

Agriculture, Journal of Ministry of, Vol. XLVI, No. 6, Sept., 1939—Cross breeding with pigs: V. C. Fishwick.

The Banker—

August, 1939—Principles of emergency finance: Nicholas Kaldor. Organizing industry for defence: R. W. B. Clarke. The future of Anglo-Roumanian trade: Mihail Romnicianu.

September, 1939—Pricing versus rationing: Prof. F. A. von Hayek. Australia's new credit policy: H. R. Randerson.

October, 1939—Economic policy in war time: "Economist." The economy of capital: Prof. F. A. von Hayek.

Bankers' Magazine

July, 1939 The crisis in New Zealand's finances: Hugh C. Jenkins.

October, 1939—Social services: A. H. Gibson.

Biometrika, July, 1939. Vol. XXXI, Parts I and II Random and systematic arrangements: Harold Jeffreys. A note on normal correlation: E. J. G. Pitman. A test for the significance of the difference between the two variances in a sample from a normal bivariate population: W. A. Morgan. Distribution of range in samples from a normal population expressed in terms of an independent estimate of standard deviation: D. Newman. On the distribution of maximum likelihood estimates: B. L. Welch. On Neyman's "smooth" test for goodness of fit. I. Distribution of the criterion χ^2 when the hypothesis tested is true: F. N. David.

Economic Journal—

June, 1939 Mr. Clark and the foreign trade multiplier (with reply by Colin Clark): D. H. Robertson. Mr. Clark's statistical determination of the multiplier: R. W. Jastram and E. S. Shaw.

September, 1939—Rates and taxes: Prof. H. O. Meredith. Real wage movements: Prof. J. H. Richardson. Expectations and employment: G. L. S. Shackle. Mr. Harrod's essay in dynamic theory: R. G. Hawtrey. Indices of industrial output: R. Stone and W. M. Stone.

Economica, Vol. VI (N.S.), No. 23, August, 1939 Twenty years of the floating debt: F. W. Paish. Italian finance and investment: B. G. Foa and P. G. Treves. Currency devaluation and public finance, 1929-1937: J. K. Horsfield.

Eugenics Review, Vol. XXXI, No. 2, July, 1939 Length of life of "men of distinction": Marjory Atsatt.

Institute of Actuaries, Journal, Vol. LXX, Pt. II, No. 328, 1939—The Indian Insurance Act, 1938: R. W. Sturgeon. Review of the recent trend of mortality in England and Wales: W. S. Hocking.

UNITED KINGDOM—*Contd.*

Institute of Bankers, Journal, October, 1939—Economic mobilization : Prof. J. H. Jones.

Manchester School of Economic and Social Studies, Vol. X, No. 2, 1939 The population scare : J. Jewkes. Control of market supplies of agricultural produce : M. G. Kendall. The fixing of retail milk prices : P. T. Bauer. Interest and bank rate : R. G. Hawtrey.

Public Administration, Vol. XVII, No. 4, October, 1939 Public services what value? : Sir Gwilym Gibbon.

Sociological Review, Vol. XXXI, No. 3, July, 1939 A note on methods of establishing the connexion between economic conditions and crime : L. Radzinowicz. Labour migration and age composition : Goronwy Daniel. Social class differences in frequency of marriage : K. T. Lim.

AUSTRALIA

Economic Record, Vol. XV, No. 28, June, 1939 Place of expectations in economic theory : L. G. Melville. Production, primary, secondary and tertiary : Allan G. B. Fisher. Marginal Productivity of Capital : Colin Clark. Growth of control of butter marketing within New Zealand : H. B. Low.

UNION OF SOUTH AFRICA—

South African Journal of Economics, Vol. 7, No. 2, June, 1939—The future of gold reconsidered : J. N. Reedman. Autarchy in German agriculture : S. D. Neumark. Industrial research : its organization in Great Britain and the possible application of similar methods to South Africa : S. G. Shuttleworth.

UNITED STATES

Actuarial Society of America, Transactions, Vol. XL, Pt. I, No. 101, 1939—Use of punch-card equipment in computation and listing of premiums and reserves under joint and last survivor immediate annuities : Eleanor A. Abbott. The education of the actuary : Arthur Pedoe. Extension of 1937 Standard Annuity Table to Age Zero and Commutation Columns for all ages at $2\frac{1}{2}\%$, $3\frac{1}{2}\%$ and $4\frac{1}{2}\%$: B. Franklin Blair. Some side-lights on Actuaries and their organizations : Wm. A. Hutcheson. Effect of war and influenza mortality (Discussion of paper previously read) : R. D. Baldwin.

American Economic Review, Vol. XXIX, No. 3, September, 1939—Price inflexibility and changes in production : Jules Backman. Five years of the Export-Import Bank : C. R. Whittlesey. Is the American Economy contracting? : Oscar Lange. Income and savings of metropolitan families : Horst Mendershausen. Alleged double taxation of savings : W. L. Crum.

Annals of the American Academy of Political and Social Science, Vol. 204, July, 1939—Democracy and the Americas (whole number).

UNITED STATES—*Contd.*

Annals of Mathematical Statistics, Vol. X, No. 2, June, 1939.—The limits of a distribution function if two expected values are given: *R. v. Mises*. Confidence limits for continuous distribution functions: *A. Wald and J. Wolfowitz*. On the power of the L_1 test for equality of several variances: *G. W. Brown*. Complete simultaneous fiducial distributions: *M. S. Bartlett*. On tests of significance in time series: *G. Tintner*. On an integral equation in population analysis: *Alfred J. Lotka*. The interpretation of certain regression methods and their use in biological and industrial research: *C. Eisenhart*.

Vol. X, No. 3, 1939—An optimum property of confidence regions associated with the likelihood function: *S. S. Wilks and J. F. Daly*. Length of the cycles which result from the graduation of chance elements: *E. L. Dodd*. On the distribution of the "Student" ratio for small samples from certain non-normal populations: *H. L. Rietz*. The problem of m rankings: *M. G. Kendall and B. Babington Smith*.

Econometrica, Vol. 7, No. 3, July, 1939—A simplified model of the causation of technological unemployment: *J. Tinbergen and P. de Wolff*. Some problems in the measurement of income elasticities: *H. Gregg Lewis and Paul H. Douglas*. Periodicity as an explanation of variation in hog production: *P. D. Bradley (Jr.) and W. L. Crum*. The practice of depreciation: *G. A. D. Preinreich*. Elasticities of expenditure in the dynamic theory of demand: *Gerhard Tintner*.

Harvard Business Review, Vol. XVIII, No. 1, Autumn, 1939—Mobilizing industry for war: *H. K. Rutherford*. British control of company accounts and finance: *T. H. Sanders*.

Journal of Political Economy, Vol. XLVII, No. 3, June, 1939—Production and distribution in the short run: *George Stigler*. Pure capitalism and the disappearance of the middle class: *Abram L. Harris*. United States government activity in low-cost housing, 1932-1938: *Gilbert A. Cam*. Averaging of income for income tax purposes: *William Vickrey*. National income and capital formation: *Morris A. Copeland and E. M. Martin*.

BELGIUM—

Institut de Recherches Économiques, Bulletin (Louvain), August, 1939—L'alimentation de la Belgique. Les données du problème en cas de blocus: *Fernand Bardhuin*.

BULGARIA—

Publications of the Statistical Institute for Economic Research, State University, 1939, No. 1-2 A.—Course of the Trade Cycle in Bulgaria, 1934-1939 (whole number).

FRANCE—

Journal des Économistes, May-June, 1939—Le commerce extérieur de la Pologne: *C. de Kownacki*. Le bilan des cinq premiers mois du plan de trois ans. Rapport au Président de la République: *N.*

Revue d'Economie Politique, May-June-July-August, 1939—La France Économique (whole number).

Journal de la Société de Statistique de Paris—

July, 1939—La Statistique et les ententes industrielles et commerciales: *Jean Caumartin*. La correspondance scientifique de Ernst Engel avec Adolphe Quetelet: *A. Julin*.

August-September, 1939 Recherches statistiques sur le salaire vital en France: *Robert Jarry*. Statistiques concernant l'industrie cinématographique: *M. Labio*. International Whaling Statistics: *A. Barriol*.

GERMANY—

Allgemeines Statistisches Archiv, Vol. 28, Part 4, 1939 --Die erste Arbeitsbucherhebung vom 25 Juni, 1938: *Dr. R. von Valla*. Die erste grossdeutsche Volks-, Berufs- und Betriebszahlung: *Dr. Roderich Plate*. Das Ostmarkgesetz und die Statistik des Deutschen Reichs: *Dr. Arnold Madde*. Das Arbeitswissenschaftliche Institut der Deutschen Arbeitsfront: *F. Zahn*.

Vierteljahrshefte zur Wirtschaftsforschung, Part I, 1939-40 - Die Wirtschaftslage in Deutschland: Die Wirtschaftslage in der Welt.

Weltwirtschaftliches Archiv, July, 1939 Weltwirtschaft, Weltwirtschaftslehre, Weltwirtschaftliches Archiv: *Hermann Bente*. Staat und Kredit in Belgien: *Gaston Cracn*. Die Bevölkerungsentwicklung Jugoslawiens und das Problem der agrarischen Uebervölkerung: *Nicholas Mirkowich*.

ITALY—

Economia, July, 1939—Il reddito e la ricchezza degli italiani nel 1936-1937: *A. degli Espinosa*. Inchiesta sulla piccola proprietà coltivatrice: *Luigi Fabbrini*.

Giornale degli Economisti, March-April, 1939 --Giuoco, assicurazione e risparmio: *Umberto Ricci*. Sulla teoria dei "clearings" complementari nel quadro dell'autarchia di approvvigionamento: *Giovanni Demaria*. Le classi sociali nell'unione Sovietica: *Leonard E. Hubbard*.

Rivista di storia economica, June, 1939—Case e botteghe a Firenze nel trecento—la rendita della proprietà fondiaria: *A. Saporì*. Della moneta "serbatoio di valori" e di altri problemi monetari: *Luigi Einaudi*.

SWITZERLAND—

Zeitschrift für Schweizerische Statistik und Volkswirtschaft, Part II, 1939—Die Finanzkraft der Schweiz : *Professor Eugen Grossmann*. Statistische Erforschung des Einzelhandels : *Peter Kaufmann*. Statistische Theorie der grössten Werte : *E. J. Gumbel*.

INTERNATIONAL—

International Labour Review—

August, 1939—Extension of collective agreements to cover entire trades and industries : *L. Hamburger*. Seasonal emigration from Poland to Germany and Latvia : *Ludwik Landau*. *September, 1939*—Workers' education in Canada : *S. Mack Eastman, Ph.D.* Social Insurance in the Netherlands. *October, 1939*—Industrial transformation in Japan, 1929–1936 : *Yoshio Kami*.

Revue de l'Institut International de Statistique, Part I, 1939—Liste des Sociétés de Statistique. Sur la méthode des "profils" et sur d'autres diagrammes à ordonnées jointes, dans le cas de séries non ordonnées. (1) : *C. Gini*. Sur les formules de répartition des revenus : *M. Fréchet*.

LIST OF ADDITIONS TO THE LIBRARY

Since the issue of Part III, 1939, the Society has received the publications enumerated below :—

I.—OFFICIAL PUBLICATIONS

(a) United Kingdom

- Health, Ministry of, and Home Office.* Report of the Inter-Departmental Committee on Abortion. London: H.M.S.O., 1939. $9\frac{3}{4}" \times 6"$. vi + 168 pp. 2s. 6d.
- and *Scottish Office.* The surface water year-book of Great Britain 1936–37. London: H.M.S.O., 1939. $13\frac{3}{4}" \times 8\frac{1}{2}"$. 137 pp. 4s.
- Imperial Economic Committee.* Industrial fibres: a summary of figures of production, trade and consumption. London: H.M.S.O., 1939. $9\frac{3}{4}" \times 7\frac{1}{2}"$. 128 pp. 2s. 6d.
- Overseas Trade, Department of.* Reports: 727. Sweden, April 1939. 112 pp. 2s. 728. Malaya, March 1939. 114 pp. 2s. 729. Turkey, April 1939. 76 pp. 1s. 3d. 730. Siam, April 1939. 53 pp. 1s. 3d. 731. Morocco, May 1939. 72 pp. 1s. 3d. 732. Bulgaria, May 1939. 76 pp. 1s. 6d. London: H.M.S.O., 1939. $9\frac{3}{4}" \times 6"$. 6 parts.

(b) British Empire

Australia —

- Commonwealth Bureau of Census and Statistics.* Census of the Commonwealth of Australia 30th June, 1933. Volume I, comprising parts i to xiv of the detailed tables. Volume II, comprising parts xv to xxvii of the detailed tables. Canberra, 1939. $12\frac{1}{2}" \times 8"$. 2 vols. (from the Bureau).

Canada —

- Dominion Bureau of Statistics.* The Canadian balance of international payments: a study of methods and results. Ottawa: 1939. $9\frac{3}{4}" \times 6\frac{1}{2}"$. 251 pp. \$1.

India—

- Bombay (Province) Labour Office.* General wage census, Part I. Perennial factories, Fourth report. Bombay: 1939. $9\frac{1}{2}" \times 6"$. x + 183 pp. 1s. 2d.

(c) Foreign Countries

Argentina —

- Dirección General de Estadística de la Nación.* Informe No. 67. La industria de la energía eléctrica en la República Argentina en el año 1937. Buenos Aires, 1939. $9\frac{1}{2}" \times 6\frac{1}{2}"$. 50 pp.

Belgium—

Office Central de Statistique—

- Recensement des logements en 1930 dans les agglomérations urbaines et dans les communes de 10,000 habitants et plus. Brussels: 1939. $12\frac{1}{4}" \times 9\frac{1}{2}"$. 56 pp.
- Recensement économique et social au 27 février 1937. Recensement des établissements industriels et commerciaux. Province de la Flandre Occidentale. 159 pp. Province de la Flandre Orientale. 133 pp. 2 vols. Recensement des inoccupés. Province d'Anvers. 87 pp. Province de Hainaut. 89 pp. Province de Namur. 77 pp. 3 vols. Brussels, 1939. $12\frac{1}{4}" \times 9\frac{1}{2}"$. 5 vols.

Czechoslovakia—*Office de Statistique—*

La Statistique Tchecoslovaque. 125. Gewerbliche Betriebszählung in der Cechoslovakischen Republik nach dem Stande vom 27 Mai 1930. III Teil. Abteilung 4. 1936. xv + 151 pp.

— 145. Mouvement de la population dans la République Tchecoslovaque au cours des années 1931 à 1933. 1938. xxxii + 6 + 521 pp.

— 146. Recensement de la population dans la République Tchecoslovaque au 1er décembre 1930. IIIe tome. Autres données démographiques (migration intérieure, défauts corporels, connaissance du lire et écrire, étrangers). 1937. xvi + 16 + 271 pp.

— 151. Recensement de la population dans l'ancienne République Tchecoslovaque au 1er décembre 1930. IVe tome, 2e partie. Ménages et familles. 1938. xx + 35 + 127 pp.

[Prague. 12" × 9". 4 vols.]

France—

Statistique Générale de la France. Recensement de 1931. Statistique des familles, productivité des mariages, habitants recensés d'après l'année de naissance. Paris, 1939. 10½" × 8½". 39 pp.

Germany—*Statistisches Reichsamt—*

Statistik des Deutschen Reichs. Band 526. Die Hauptfeststellung der Einheitswerte nach dem Stand vom 1 Januar 1935. 133 pp.

— Band 528, I. Die Finanzwirtschaft der öffentlichen Verwaltung im Deutschen Reich, Heft I (Teil A und B). Die Ausgaben und Einnahmen der Länder, Gemeinden und Gemeindeverbände für das Rechnungsjahr 1936/37 und die Rücklagenbestände der Gemeinden und Gemeindeverbände am 31 März 1938 Personalstand der Gemeinden und Gemeindeverbände am 31 März und 30 September 1937. 229 pp.

— Band 531. Die Volksabstimmung und die Wahlen zum Grossdeutschen Reichstag am 10 April 1938. Die Ergänzungswahlen zum Grossdeutschen Reichstag am 4 Dezember 1938.

[Berlin, 1939. 12" × 8½". 3 vols.]

Italy—*Istituto Centrale di Statistica—*

Censimento industriale 1937. Monografia N.1. L'industria dello zucchero. 49 pp. L.5.

Monografia N.2. Le industrie del malto della birra e degli estratti di malto. 46 pp. L.5.

Monografia N.3. L'industria della lavorazione del latte e dei prodotti derivati. 262 pp. L.25.

[Rome, 1939. 12" × 9". 3 vols.]

Latvia—

Bureau de Statistique. Commerce extérieur et transit de la Lettonie 1938. Riga, 1939. 10½" × 7½". lxi + 401 pp.

Norway—*Det Statistiske Sentralbyrå—*

Norges Offisielle Statistikk, IX, 164. Bedriftstelling i Norge 9 Oktober 1936. Annet hefte. Oslo, 1939. 9½" × 6½". 235 pp.

— IX, 169 Forbruket av trevirke pa gardene 1936/37. Oslo, 1939. 9½" × 6½". 92 pp.

Poland—*Office Central de Statistique—*

Statistique de la Pologne, Série C. Fasc. 106. Statistique de l'assiette de l'impôt sur le revenu pour l'année fiscale 1936. 95 pp.

— Série C. Fasc. 107. Statistique des transports par les voies navigables intérieures, 1938. 27 pp.

[Warsaw, 1939. 11½" × 8". 2 vols.]

Portugal—*Instituto Nacional de Estatística—*

Anuário demográfico (estatística do movimento fisiológico da população de Portugal). Ano de 1937. Lisbon, 1939. $10\frac{1}{2}'' \times 7\frac{1}{4}''$. xv + 378 pp.
 Anuário estatístico de Portugal. Ano de 1937. Lisbon, 1939. $10\frac{1}{2}'' \times 7\frac{1}{4}''$. 656 pp.

Rumania—*Institutul Central de Statistică—*

Statistica prețurilor 1937. Bucurest, 1939. $9\frac{1}{2}'' \times 6\frac{3}{4}''$. vi + 163 pp.
 Statistica societăților anonime din România. Vol. xix, 1937. Bucurest, 1939. $9\frac{1}{2}'' \times 6\frac{3}{4}''$. vii + 184 pp.

Spain—

Servicio Nacional de Estadística. Boletín de estadística. Número 1, enero-marzo 1939. Madrid, 1939. $9\frac{1}{2}'' \times 6\frac{3}{4}''$. 91 pp.

Sweden—

Kungl. Järnvägsstyrelsen. Vagnlastgodstrafiken å statens järnvagar, år 1937. Stockholm, 1939. $12'' \times 9\frac{1}{2}''$. 20 + 251 pp.

Kungl. Skolöverstyrelsen. Yrkesundervisningen läsalet 1936-1937. Stockholm, 1939. $9\frac{1}{2}'' \times 6\frac{1}{4}''$. 98 + 79 pp.

U.S.A.—

Bureau of Foreign and Domestic Commerce. Economic series 4. Oversea travel and travel expenditures in the balance of international payments of the United States 1919-38, by *A. Maffry*. Washington: Government Printing Office, 1939. $9'' \times 6''$. 95 pp. 15c. (From the American Commercial Attaché, London.)

Department of Labor. Migration of labor. Preliminary report of the Secretary of Labor, pursuant to S. Res. 298 (74th Congress). A resolution to make certain investigations concerning the social and economic needs of laborers migrating across state lines. Washington, 1939. $10\frac{1}{2}'' \times 8''$. 2 vols.

Works Progress Administration. Production, employment and productivity in 59 manufacturing industries, 1919-36, with an appendix on the electric light and power and telephone industries, by *H. Magdoff*, *I. H. Siegel*, and *M. B. Davis*. Philadelphia, Penn.: W.P.A. National Research Project, 1939. $10'' \times 7''$. 3 vols.

(d) International**League of Nations—***Economic and Financial Section—*

Economic Committee. Observations on the present prospects of commercial policy. $9\frac{1}{2}'' \times 6\frac{1}{4}''$. 27 pp.

Financial Committee. Report to the Council on the work of the 68th session of the Committee. Agricultural credit: medium term credit to industry. $9\frac{1}{2}'' \times 6\frac{1}{4}''$. 23 pp.

Prevention of international double taxation and fiscal evasion. Two decades of progress under the League of Nations, by *Mitchell B. Carroll*. $9\frac{1}{2}'' \times 6\frac{1}{4}''$. 53 pp.

Prosperity and depression, a theoretical analysis of cyclical movements, by *Gottfried von Haberler*. New revised and enlarged edition. $9'' \times 6''$. xix + 473 pp.

Report of the Committee for the Study of International Loan Contracts. $9\frac{1}{2}'' \times 6\frac{1}{4}''$. 41 pp.

Review of world trade 1938. $10\frac{1}{2}'' \times 8\frac{1}{4}''$. 85 pp.

Statistical testing of business-cycle theories, II. Business cycles in the United States of America 1919-1932, by *J. Tinbergen*. $9\frac{1}{2}'' \times 6\frac{1}{4}''$. 244 pp.

Statistical year-book of the League of Nations 1938/39. $9\frac{1}{2}'' \times 7\frac{1}{4}''$. 330 pp.

League of Nations—Contd.

Health Organisation. Technical Commission on Nutrition. Guiding principles for studies on the nutrition of populations, by *Dr. E. J. Bigwood*. 9½" × 6¼". 281 pp. [Geneva (London: Allen & Unwin), 1939.]

II.—AUTHORS AND MISCELLANEOUS

Amoroso (L.) and others. Cournot, nella economia e nella filosofia. Padova: Cedam, 1939. 10" × 7", 245 pp. *L.* 20.

Ashton (T. S.). An eighteenth-century industrialist: Peter Stubs of Warrington, 1756–1806. Manchester University Press, 1939. 8½" × 5½". x + 156 pp. 8s. 6d.

Binder (Paul). Die Schalthebel der Konjunktur Kaufkraftsinsatz und Kaufkraftstilllegung als Bestimmungsgründe des Volkseinkommens. Munich & Berlin: R. Oldenbourg, 1939. 9" × 6". 106 pp. *Rm.* 4.80.

Birmingham Information Service on Slavonic Countries. Poland—Monograph No. 4. The national income of Poland, July 1937. 15 pp. Poland—Monograph No. 5. Poland's foreign trade. July 1939. 27 pp. Birmingham: The University, 1937–39. 10½" × 8½".

Bliss (Charles A.). The structure of manufacturing production: a cross-section view. New York: National Bureau of Economic Research. (Publication No. 36.) London: Macmillan, 1939. 9" × 6". xvii + 231 pp. 12s.

Brij Narain. Marxism is dead. Lahore: Rama Krishna & Sons, 1939. 7¼" × 5". 265 pp. 5s. 6d.

British Association for the Advancement of Science. Mathematical tables. Volume VII. The probability integral, by *W. F. Sheppard*, completed and edited by the Committee for the Calculation of Mathematical Tables. Cambridge: The University Press, 1939. 11" × 8½". xi + 34 pp. 8s. 6d.

Burr (G. B.). Sur-tax and undistributed income: assessment and avoidance. London: Taxation Publishing Co. & Gee & Co., 1939. 8¼" × 5½". xii + 237 pp. 12s. 6d.

China Institute of Economic and Statistical Research, Shanghai. A study of the rural economy of Wuhung, Chekiang. Shanghai: 1939. 10½" × 7½". v + 121 pp.

Chugerman (Samuel). Lester F. Ward, the American Aristotle: a summary and interpretation of his sociology. Durham, North Carolina: Duke University Press, 1939. 9" × 6". xiii + 591 pp. \$5.

Croner (Fritz). De Svenska privatanställda: en sociologisk studie. Stockholm: Kooperativa Förbundets Bokförlag, 1939. 10" × 6½". 474 pp. *Kr.* 12.

Das (Rajani Kanta). Principles and problems of Indian labour legislation. Calcutta: The University, 1938. 8½" × 5¼". xiv + 281 pp.

Deutsche Industriebank. Berlin. Geschäftsbericht über das fünfzehnte Geschäftsjahr (1 April 1938 bis 31 März 1939). Berlin: 1939. 11¼" × 8¼". 25 pp.

Drolet (Gedias J.). Present trend of case fatality rates in tuberculosis. Reprinted from *The American Review of Tuberculosis*, Feb. 1938. pp. 125–151. 10" × 7".

Dubey (Daya Shankar) and Agrawal (Shankar Lal). Elementary statistics for Indian students. Revised and enlarged edition. Allahabad: The Indian Press, 1939. 8¼" × 5½". xv + 392 pp. *Rs.* 6.

Elfving (Gustav). Über die Interpolation von Markoffschen Ketten. Helsingfors: Akademische Buchhandlung, 1938. 9½" × 6". 8 pp.

Garguli (Birendranath). Whither rupee? a study in the ratio controversy. Delhi: S. Chand & Co., 1939. 7¼" × 4¾". xi + 165 + xi pp. *Rs.* 3.

Greenwood (Major). Occupational and economic factors of mortality. Reprinted from the *British Medical Journal*, April 29th, 1939. 8½" × 5½". 11 pp. (From the author.)

Greenwood (M.), Hill (A. Bradford), Topley (W. W. C.), and Wilson (Joyce). The effect of withdrawing mice from an infected herd at varying intervals. Cambridge: From the *Journal of Hygiene*. Vol. xxxix, No. 2, pp. 109–30. Mar. 1939. 10¼" × 7". (From the authors.)

II.—Authors and Miscellaneous—Contd.

- Haas (J. H. de)*. Infant mortality in Batavia for the years 1935 and 1936. Reprinted from the *Indian Journal of Pediatrics*. Jan. 1939, pp. 12-45. 9½" × 6½".
- Haavelmo (Trygve)*. A dynamic study of pig production in Denmark. (Studier fra Aarhus Universitets Økonomiske Institut, Nr. 4.) Copenhagen: Einar Munksgaard, 1939. 9½" × 6½". 48 pp. Cr. 2.
- Hamilton (G. S.)*. Brewery accounting. London: Gee & Co., 1939. 8½" × 5½". 139 pp.
- Hart (P. D'Arcy) and Wright (G. Payling)*. Tuberculosis and social conditions in England with special reference to young adults (a statistical study). . . . London: Nat. Assn. for the Prevention of Tuberculosis, 1939. 9½" × 6". vii + 165 pp. 3s.
- Hawtrej (R. G.)*. The gold standard in theory and practice. 4th edition. London: Longmans Green, 1939. 7½" × 4¾". ix + 315 pp. 7s. 6d.
- Holgate (H. C. F.)*. The contingent liabilities of the English commercial banks, with an introductory essay on their published accounts. London: Gee & Co., 1939. 8½" × 5½". viii + 77 pp. 5s.
- Irvine (William)*. Walter Bagehot. London: Longmans Green, 1939. 8½" × 5½". 303 pp. 12s. 6d.
- Jones (J. Harry), Curthwright (G.), and Guénault (P. H.)*. The coal-mining industry: an international study in planning. London: Pitman, 1939. 8½" × 5½". x + 394 pp. 16s.
- Kuczynski (Robert R.)*. The Cameroons and Togoland: a demographic study. London: Oxford University Press, 1939. (Issued under the auspices of the Royal Institute of International Affairs.) 9½" × 6". xviii + 579 pp. 30s.
- Liem Tjay Tie and Haas (J. H. de)*. Zuigelingensterfte onder de Chinesesche bevolking te Batavia in 1935, 1936 en 1937. Batavia: *Geneeskundig Tijdschrift voor Nederlandsch-Indië*, 1939. pp. 897-927. 9½" × 6".
- Liem Tjay Tie, Soeparno, and Haas (J. H. de)*. Weight and height of native and Chinese infants at Batavia. Reprinted from *Indian Journal of Pediatrics*, Oct. 1938. 22 pp. 9½" × 6½".
- Liverpool, University of. The Social Survey of Merseyside. No. 2. A study of migration to Merseyside, with special reference to Irish immigration. 1931. 11 pp. 6d. No. 3. Poverty on Merseyside. 1931. 15 pp. 6d. No. 4. Domestic service. 1932. 20 pp. 6d. No. 5. Social factors in secondary education. 1932. 44 pp. 6d. No. 6. Local government on Merseyside. 23 pp. 6d. No. 7. Public health administration on Merseyside. 1933. 31 pp. 6d. No. 8. Elementary education on Merseyside. 1934. 18 pp. 6d. No. 9. Public assistance on Merseyside. 1934. 24 pp. 6d. Liverpool: The University, Statistics Division. 9½" × 6".
- Liverpool University of. Social Science Department, Statistics Division. Merseyside: co-operation of passenger transport services. 1935. 39 pp. 1s. Merseyside: trade and employment. 1935. 39 pp. 1s. Merseyside: the relief of the poor. 1936. 24 pp. 1s. *Jones (D. Caradog)*. Trade revival in a depressed area. 1937. 72 pp. 2s. 6d. *Holford (W. G.) and Eden (W. A.)*. The future of Merseyside: town and country planning schemes. 1937. 84 pp. 2s. 6d. Migration to and from Merseyside: home, Irish, overseas. 1938. 40 pp. 1s. Liverpool: the University Press. 8½" × 5½".
- Lloyd of Dolobran (The Rt. Hon. Lord)*. Leadership in democracy. (Walker Trust Lectures in Leadership No. VII.) London: Oxford University Press, 1939. 8½" × 5½". 21 pp. 2s.
- Lwów (Université de). Institut de Géophysique et de Météorologie. Communications Vol. 10. Nos. 119 à 133 des résultats des recherches de Henryk Arctowski et de ses collaborateurs. . . Lwów, 1939. 9" × 6". 229 pp. (From Prof. Arctowski.)
- Marketing facts and figures, 1939 edition: a summary of the ten test towns. Bristol, Swansea, Gloucester, Cheltenham, Stoke on Trent, Derby, Leicester, Hull, Grimsby, Lincoln. London: Northcliffe Newspapers Group, 1939. 10" × 7½". 1 broadsheet and 10 booklets.
- Nationalekonomisk Tidsskrift for Samfundsspørgsmaal Økonomi og Handel.

II.—Authors and Miscellaneous—Contd.

- ... Inholdsfortegnelse, 1913–1937. Copenhagen : Gyldendalske Boghandel, 1939. $9\frac{3}{4}'' \times 6\frac{3}{4}''$. 79 pp.
- Oxford. Agricultural Economics Research Institute. The agricultural register, 1938–9 : being a record of legislation, organization, supplies and prices. Oxford, The Institute, 1939. $7\frac{1}{4}'' \times 4\frac{3}{4}''$. 359 pp. 5s.
- Polish Statistical Society. Przegląd statystyczny : organ Polskiego Towarzystwa Statystycznego. Tom I Nr. I 1938 to Tom I Nr. I 1939. Warsaw : 1938–9. $8'' \times 5\frac{1}{2}''$. 4 parts.
- Radice (E. A.). Savings in Great Britain, 1922–1935 : an analysis of the causes of variations in savings. London : Oxford University Press, 1939. $8\frac{1}{2}'' \times 5\frac{1}{2}''$. 146 pp. 8s. 6d.
- Ramdas (L. A.) and Kalamkar (R. J.). Statistical investigations on crop-weather relationship in India. Calcutta : Reprinted from *Sankhyā*. May 1938. pp. 285–90. $11\frac{1}{4}'' \times 8\frac{1}{4}''$.
- Saulnier (Raymond J.). Contemporary monetary theory : studies of some recent theories of money, prices, and production. New York : Columbia University Press, 1939. (London : Humphrey Milford.) $8\frac{1}{2}'' \times 5\frac{1}{2}''$. 420 pp. 20s.
- Sivaswamy (K. G.). Legislative protection and relief of agriculturalist debtors in India. Poona : Gokhale Institute of Politics and Economics, Publications No. 6. 1939. $9\frac{1}{2}'' \times 6\frac{1}{2}''$. vii + x + 390 pp. Rs. 4.
- South Manchuria Railway Company. Sixth report on progress in Manchuria to 1939. Dairen : 1939. $11\frac{1}{4}'' \times 7\frac{1}{4}''$. 236 pp.
- Spiegelman (Mortimer). Mortality in relation to widowhood. Reprinted from *Proceedings of American Philosophical Society*, No. 4. 1939. pp. 541–58. $10'' \times 6\frac{1}{2}''$.
- Sukhatme (P. V.). On bipartitional functions. London : *Phil. Trans. of the Royal Society*. Series A. No. 780. pp. 375–409. 1938. $12'' \times 9''$.
- Taylor (R. M.), Lisbonne (M.), Lidal (L. F.), and Hazemann (R. H.). Investigations on undulant fever in France. Geneva : Extract from *Bulletin of the Health Organisation of the League of Nations*. Vol. vii, 1938. pp. 503–45. $9\frac{1}{2}'' \times 6''$.
- Turner (A. Willard). Trends in Canadian bond, stock and commodity markets, 1928 to 1938. Reprinted from *Journal of the American Statistical Association*, June 1939. pp. 291–8. $9\frac{1}{4}'' \times 6''$.
- Vickery (C. W.). Punched card technique for the correction of bias in sampling. Reprinted from *Journal of the American Statistical Association*, Sept. 1938. pp. 552–6. $9\frac{1}{2}'' \times 6''$.
- Weibull (W.). A statistical theory of the strength of materials. Stockholm : Ingeniorsvetenskapsakademien (Handlingar Nr. 151). 1939. $9\frac{1}{2}'' \times 6\frac{1}{2}''$. 45 pp.
- Weinberger (Otto). *Economia matematica*. Naples : I.T.E.A., 1938. $10'' \times 7''$. 75 pp.
- Josef Hain. Jena : Reprint from *Allgemeines Statistisches Archiv*, 28 Band, 1939. pp. 291–8. $9\frac{3}{4}'' \times 6\frac{1}{2}''$.

PERIODICALS RECEIVED BY THE LIBRARY.

ANNUAL LIST.

In addition to the publications named in the bi-monthly lists, the Society receives the official and other periodicals enumerated below.

(a) United Kingdom and its several Divisions.

National.

United Kingdom---

Admiralty. Health of the Navy. Fleets. Navy appropriation account. Navy dockyard accounts.

Agriculture and Fisheries, Ministry of. Agricultural market report. Agricultural marketing schemes report. Agricultural returns. Agricultural statistics. Agricultural Wages (Regulation) Act, report of proceedings. Diseases of Animals Acts, report of proceedings. Economic series reports. Journal of the Ministry of Agriculture. Land Division, report. Report on sea fisheries. Salmon and freshwater fisheries report. Sea fisheries, statistical tables.

Air Ministry. Air services appropriation account. Civil aviation statistical and technical review. Health of the Royal Air Force. Progress of civil aviation.

Charity Commission. Report.

Civil Service Commission. Annual report.

Colonial Office. Annual Colonial reports. Economic survey of the Colonial Empire.

Control, Board of. Costing returns. Lunacy and mental deficiency.

Crown Lands, Office of Commissioners of. Report.

Customs and Excise, Board of. Customs and excise tariff of the United Kingdom. Report of the Commissioners.

Development Commission. Report.

Dominions Office. Report of Oversea Settlement Board.

Ecclesiastical Commission. Report.

Education, Board of. Education report and statistics. Health of the school child.

Electricity Commission. Annual report. Engineering and financial statistics. Generation of electricity.

Foreign Office. Suez Canal: annual return of shipping and tonnage.

Forestry Commission. Annual report.

Friendly Societies, Registry of. Reports of the Chief Registrar. Report of the Industrial Assurance Commissioner.

General Register Office. Weekly return of births and deaths. Quarterly return of births, deaths and marriages. Registrar-General's statistical review.

Health, Ministry of. Accounts of the National Health Insurance Fund. Annual report of the Ministry of Health. Annual report on alkali works. Costing returns. Local government financial statistics. Persons in receipt of poor relief. Rates and rateable values in England and Wales. Reports on public health and medical subjects. State of the public health.

Herring Industry Board. Annual report.

Home Office. Aliens order: return of alien passengers. Aliens (naturalisation) return. Annual report of the Chief Inspector of Factories. Criminal statistics: England and Wales. Licensing statistics. Offences relating to motor vehicles. Police (Counties and Boroughs), reports of H.M. Inspectors of Constabulary. Racecourse Betting Control Board, annual report and accounts. Report of the Commissioner of Police of the

(a) United Kingdom and its several Divisions—*Contd.***United Kingdom—*Contd.***

Metropolis. Report of the Commissioner of prisons and the Directors of convict prisons. Workmen's compensation statistics.

Imperial Economic Committee. Dairy produce supplies. Fruit, production and trade. Supplies of canned and dried fruit. Grain crops. Industrial fibres. Meat. Plantation crops. Vegetable oils and oilseeds. Wool production and trade.

Imperial Institute. Mineral industry of the British Empire and foreign countries, statistical summary.

India Office. Home accounts. Statistical abstract for British India. Return of the budget of the Governor-General of India in Council.

Industrial Health Research Board. Reports.

Inland Revenue, Board of. Report of Commissioners.

Labour, Ministry of. Abstract of labour statistics. Annual report of the Ministry of Labour. Juvenile employment (London) reports. Local unemployment index. Ministry of Labour gazette. Report of the Unemployment Assistance Board.

Lord Chancellor's Department. Civil judicial statistics.

Medical Research Council. Annual report. Special report series.

Mines Department. Annual report of Secretary for Mines. Deaths from accidents in mines. Electrical Inspector of Mines, report. List of mines. Miners' welfare fund, report. Safety in Mines Research Board, report.

Mint, Royal. Annual report of the Deputy Master and Comptroller.

National Debt Commissioners. Local loans fund, accounts, National Health insurance fund and Unemployment insurance fund, account of securities held. Post Office savings banks, accounts. Savings banks and friendly societies, annual account. Trustee savings banks, annual report of the Inspection Committee.

National Insurance Audit Department. Report.

Overseas Trade, Department of. Reports by H.M. Trade Commissioners.

Patent Office. Report of the Comptroller-General.

Pensions, Ministry of. Annual report.

Permanent Consultative Committee on Official Statistics. Guide to current official statistics.

Post Office. P.O. Commercial accounts. British Broadcasting Corporation, annual report.

Public Trustee Office. General report.

Public Works Loan Board. Annual report.

Queen Anne's Bounty Office. Annual report.

Scientific and Industrial Research, Department of. Annual report.

Stationery Office. British imperial calendar.

Trade, Board of. Accounts relating to trade and navigation [monthly].

Annual statement of trade. Bankruptcy. Board of Trade journal. Companies. Foreign trade and commerce [quarterly]. Gas undertakings. Nationality of carrying vessels. Navigation and shipping. Pilotage return. Shipping casualties and deaths on vessels. Statistical abstract for the British Empire. Statistical abstract for the United Kingdom. Survey of industrial development. Weights and measures.

Transport, Ministry of. London and Home Counties Traffic Advisory Committee, annual report. Railway accidents. Railway companies (staff) return. Railway Rates Tribunal, annual report. Railway returns. Road and Rail Traffic Act: annual reports of the licensing authorities. Return of road accidents. Road Fund, report on administration of. Tramways and light railways (street and road) and trolley vehicle undertakings.

Treasury. Appropriation accounts: Civil service, revenue departments. Consolidated fund, abstract account. Finance accounts. Financial statement. National debt return. National Radium Trust and Radium Commission, annual report. Public departments, gross and net cost. Public social services, return of expenditure. Public income and expenditure. Trading accounts and balance sheets.

University Grants Committee. Returns from universities and university colleges in receipt of Treasury grant.

(a) **United Kingdom and its several Divisions—Contd.****United Kingdom—Contd.**

War Office. Army appropriation account. General annual report of the British Army. Health of the army. War Office Library, annual supplement to subject index.

Municipal and other local returns.

LONDON COUNTY COUNCIL. Annual report. L.C.C. gazette. London statistics. Statistical abstract.

METROPOLITAN BOROUGH. Accounts: Battersea, Islington. Medical Officer of Health, reports: Paddington, Shoreditch.

MUNICIPAL BOROUGH. Accounts: Birmingham, Carlisle, Chester, Ipswich, Leicester, Liverpool, Manchester, Nottingham, Southgate. Medical Officer of Health, reports: Birmingham, Liverpool, Manchester, West Ham, Wolverhampton.

Scotland—

Agriculture, Department of. Agricultural returns. Agricultural statistics. Report of the Department of Agriculture. Report on the profitability of farming in Scotland.

Control, General Board of. Annual report.

Education Department, Scottish. Annual reports, combined volume.

Fishery Board for Scotland. Annual report. Sea fisheries: statistical tables.

Health, Department of. Annual report. Report on incapacitating sickness in the insured population.

Prisons Department. Annual report. Civil judicial statistics. Criminal statistics.

Registrar-General. Annual report. Births, deaths and marriages [weekly, monthly, and quarterly returns].

Scottish Office. Constabulary, report of H.M. Inspector. Local taxation returns.

ABERDEEN. Report of the Medical Officer of Health.

EDINBURGH. Municipal accounts.

GLASGOW. Report of the Medical Officer of Health.

Northern Ireland—

Commerce, Ministry of. Electricity Supply Acts, annual report. Industrial assurance: report of the Commissioner.

Education, Ministry of. Report.

General Register Office. Registrar-General's annual report. Quarterly return of births, deaths, and marriages. Ulster year-book.

Home Affairs, Ministry of. Local taxation returns.

Miscellaneous Publications.

Accountant. Accountants' magazine. Agricultural Economics Society, journal of proceedings. Agricultural Economics Research Institute, Oxford: the agricultural register. Alliance news. Alliance year book and temperance reformers' handbook. Anglo-Swedish review. Annals of eugenics. Auctioneers' and Estate Agents' Institute, Journal.

Banking almanack. Banker. Bankers' magazine. Bank of England, statistical summary. Barclays Bank monthly review. Barclays Bank (Dominion, colonial, and overseas) monthly trade cables. Biometrika. Brewers' almanack and wine and spirit trade annual. British Association for the Advancement of Science, report of the annual meeting. British Metal Corporation: Quarterly statistics, Review of base metal conditions. British Iron and Steel Federation: statistical bulletin [monthly], statistics [annual]. British Library of Political and Economic Science monthly list. British Waterworks Association, official circular. Broomhall's corn trade year-book. Building industries survey. Building societies year-book.

(a) United Kingdom and its several Divisions—*Contd.**Miscellaneous Publications—Contd.*

- Certified Accountants, journal. Chamber of Commerce journal. Chamber of Shipping, annual report. Chartered Institute of Secretaries, proceedings, etc. Chartered Surveyors' Institution, journal, list of Fellows. Colliery guardian. Co-operative Union Ltd., annual Congress report. Corporation of Foreign Bondholders, annual report.
- Daily Herald monthly new capital digest. Daily Mail year-book. Dalgety and Co., annual review.
- East India Association journal. Economic history. Economic journal. Economica. Economist. Eugenics review.
- Faculty of Actuaries, transactions. Financial review of reviews. Fireman. Geographical journal.
- Health and empire. Horse owners' reference book. Hospitals year-book.
- Incorporated Association of Rating and Valuation Officers: journal, Report of Annual Meeting, year-book. Institute of Actuaries, journal, year-book. Institute of Actuaries Students' Society, journal. Institute of Bankers, journal. Institute of Chartered Accountants, list of members. Institution of Civil Engineers, journal, list of members. International cotton bulletin. International Rubber Regulation Committee, Statistical bulletin. International Tin Research and Development Council: Publications. Report. Statistical year-book. Tin and its uses. Iron and Steel Institute, journal.
- Jacks (W. & Co.) trade barometer.
- King Edward's Hospital Fund: Annual report, statistical summary.
- Land and liberty. Light and lighting. Liverpool Cotton Association, annual and weekly circulars. Lloyds Bank monthly review. Lloyd's Register: annual report, shipbuilding returns, wreck returns. London and Cambridge Economic Service: monthly bulletin, and special memoranda. London Bankers' Clearing House, annual statement. London Passenger Transport Board, annual report and accounts.
- Mallett's weekly wool chart. Manchester Guardian commercial. Manchester school. Manchester Statistical Society, transactions. Mersey Docks and Harbour Board, annual report. Metropolitan Water Board, annual report. Midland Bank monthly review. Mining Association of Great Britain, Statistical review of the coal industry. Municipal year-book.
- National Association for Prevention of Tuberculosis: transactions, report of Council. Nature.
- Oxford economic papers.
- Peabody Donation Fund, report of Governors. People's year-book. Pixley and Abell's circular. Planning. Population. Post magazine. Public administration. Publishers' circular.
- Quarterly journal of mathematics. Quin's metal handbook and statistics.
- Registered accountant. Review of economic studies. Rothamsted Experimental Station: annual report. Royal Agricultural Society of England, journal. Royal College of Physicians of London, list of Fellows, etc. Royal College of Surgeons of England, Calendar. Royal Institution, proceedings. Royal Meteorological Society, journal, phenological report. Royal Sanitary Institute, journal. Royal Society of Arts, journal. Royal Society of Edinburgh, proceedings, transactions.
- Samuel Montagu & Co., Weekly letter. Annual bullion letter, Scottish Chartered Accountants, official directory. Secretary. Secretaries' Association, year-book. Seyd (R.E.), statistics of failures. Signal. Society of Motor Manufacturers: the motor industry of Great Britain. Society of Incorporated Accountants and Auditors, year-book. Sociological review. Statesman's year-book. Statist. Stock exchange gazette. Stock exchange year-book.
- Statistical research memoirs.
- Tattersall's cotton trade review [annual]. Times. Times literary supplement. Times trade and engineering supplement. Tin.
- United empire. University calendars: University of London; University College, London; Manchester University; University College of Wales; Queen's University, Belfast.

(a) **United Kingdom and its several Divisions—Contd.***Miscellaneous Publications—Contd.*

Vacher's parliamentary companion.

Wallis' index cotton circular. Weddel & Co., Annual review of the imported dairy produce trade. Westminster Bank review. Whitaker's almanack.

Willing's press guide. Who's who.

Year-book of scientific and learned societies.

(b) **British Empire.****Australia—**

Bureau of Census and Statistics. Australian demography. Finance. Labour report. Monthly review of business statistics. Official year book. Oversea trade. Pocket compendium of Australian statistics. Production. Quarterly summary of Australian statistics. Transport and communication.

Commonwealth Grants Commission. Report.

Department of Health. Health.

Commonwealth Bank of Australia. Statistical bulletin.

Economic record.

NEW SOUTH WALES—

Auditor General. Report.

Bureau of Statistics and Economics. Official year book. Statistical bulletin. Statistical register.

Department of Railways. Report of the Commissioner.

Industrial Registrar. Trade unions.

Department of Public Works and Local Government. Report.

QUEENSLAND—

Government Statistician's Office. Agricultural and dairying production. Live stock and pastoral production. Queensland year book. Statistics of the State of Queensland.

SOUTH AUSTRALIA—

Public Library, Museum and Art Gallery. Annual report.

Statistical Office. Statesman's pocket year book. Statistical register.

TASMANIA—

Bureau of Census and Statistics, Tasmania Branch. Pocket year book. Statistics of the State of Tasmania.

Report on Government Railways and Ferry Service.

VICTORIA—

Office of the Government Statist. Victoria year book. Friendly societies, report.

Public Library, Museum and National Gallery. Report of the Trustees.

WESTERN AUSTRALIA—

Department of Mines. Report.

Government Statistician's Department. Pocket year book. Quarterly statistical abstract. Statistical register.

Registrar of Friendly Societies. Report of proceedings.

British West Indies—

Tropical agriculture.

Canada—

Department of Agriculture. Report of the Veterinary Director General.

Department of Finance. Public accounts.

Department of Justice. Annual report of the Superintendent of Penitentiaries.

(b) **British Empire—Contd.****Canada—Contd.**

Department of Labour. Labour gazette. Prices in Canada and other countries. Wages and hours of labour.

Department of Public Works. Report of the Minister of Public Works.

Dominion Bureau of Statistics. Annual survey of education. Automobile accidents. Canada year book. Chemicals and allied products. Coal statistics. Fisheries statistics. Iron and steel industry. Manufactures of non-ferrous metals. Manufacturing industries of Canada. Mineral production. Monthly review of business statistics. Statistics of dairy factories. Statistics of steam railways. Trade of Canada [fiscal year, calendar year, quarterly returns]. Vital statistics.

ALBERTA. *Department of Public Health.* Annual report of the Vital Statistics Branch.

ONTARIO. *Department of Agriculture.* Annual report of the Statistics Branch. Monthly crop report. Monthly Dairy report.

QUEBEC (PROVINCE). Statistical year book.

Bank of Canada, statistical summary.

Bank of Nova Scotia, monthly review.

Canadian Bank of Commerce, monthly commercial letter; annual statement.

Royal Bank of Canada, monthly letters; annual report.

Ceylon—

Administrative reports. Blue book. Railways (Government) report. Papers laid before State Council.

Eire—

Currency Commission. Quarterly statistical bulletin.

Department of Agriculture. Journal.

Department of Industry and Commerce. Census of industrial production. Irish trade journal and statistical bulletin. Statistical abstract. Trade and shipping statistics [annual]. Trade statistics [monthly].

Department of Local Government and Public Health. Annual report of the Registrar-General. Quarterly return of the marriages, births and deaths.

Irish Agricultural Organisation Society Ltd. Annual report.

Statistical and Social Inquiry Society of Ireland, Journal.

Federated Malay States -

F.M.S. government gazette; Manual of taxes, licences, duties, fees, etc. Report of the Customs and Excise Department.

India—

Department of Commercial Intelligence and Statistics. Agricultural statistics. Indian coal statistics. Monthly statistics of cotton spinning and weaving. Monthly statistics of production in certain selected industries. Review of the trade of India. Sea-borne trade, annual statement of. Sea-borne trade and navigation [monthly]. Sea-borne trade and navigation for the calendar year. Statistical abstract for British India. Statistical tables relating to banks. Trade at stations adjacent to the land frontier routes.

Department of Industries and Labour. Annual report of Chief Inspector of Mines.

Meteorological Office. Memoirs. Scientific notes.

ASSAM. Administration report.

BENGAL. Administration report. Report on maritime trade.

BOMBAY. Labour gazette.

PUNJAB. Memoirs of the Irrigation Research Institute. Public health report.

Indian accountant.

(b) **British Empire—Contd.****India—Contd.**

Indian journal of economics.
Karachi cotton annual.
Punjab Board of Economic Enquiry, publications.
Sankhyā, Indian journal of statistics.

Jamaica—

Annual report of the Registrar General's Department.

Malaya—

Department of Statistics S.S. and F.M.S. Average prices, trade, exchange, currency, cost of living. Foreign imports and exports [annual]. Malayan statistics [monthly]. Rubber statistics handbook.

Mauritius —

Blue book.

New Zealand—

Census and Statistics Office. Agricultural and pastoral production. Factory and building production. Friendly societies and trades unions. Insurance statistics. Justice statistics. Local authorities' handbook. Monthly abstract of statistics. New Zealand official year-book. Population and buildings. Statistics of incomes and income tax. Statistical report on prices, wages . . . banking, building societies, commercial afforestation, incomes and income tax. Trade and shipping. Vital statistics.
Auckland Chamber of Commerce, journal.
Canterbury Chamber of Commerce, bulletin.
Royal Society of New Zealand, transactions and proceedings.
Wellington Harbour Board, accounts.

Nigeria—

Nigeria trade summary.

Southern Rhodesia—

Department of Statistics. Annual statement of the trade. Economic and statistical bulletin. Report on the insurance statistics. Statistical year-book of Southern Rhodesia.
Rhodesia Chamber of Mines: annual report, monthly returns.

Uganda Protectorate—

Blue book.

Union of South Africa—

Department of Customs and Excise. Annual statement of the trade and shipping. Trade of the Union of South Africa [quarterly].
Department of Mines. Annual report of the Government Mining Engineer.
Office of Census and Statistics. Census of industrial establishments. Official year book. Statistics of migration. Report on the vital statistics.
CAPE OF GOOD HOPE. Ordinances.
South African journal of economics.
Transvaal Chamber of Mines: annual report, Monthly analysis of gold production.

(c) Foreign Countries.

Alsace-Lorraine—

Comptes rendus statistiques.

Argentine Republic—

Banco Central de la Republica Argentina. Annual report.
Dirección General de Estadística. Anuario del comercio exterior. El comercio exterior Argentino.
 BUENOS AIRES. Rivista de estadística municipal.
Banco de la Nación Argentina, Annual report and balance sheet. Revista.

Austria—

Bundesministerium für Handel und Verkehr. Statistik des Aussenhandels Österreichs.
Bundesministerium für Land- und Fortwirtschaft. Statistik der Ernte.
Statistisches Landesamt. Statistische Nachrichten. Statistisches Jahrbuch für Österreich.
 VIENNA. *Statistisches Amt der Stadt.* Mitteilungen aus Statistik. Statistisches Jahrbuch. Statistisches Taschenbuch.
 Monatsberichte des Instituts für Konjunkturforschung.

Belgium—

Ministère des Finances. Bulletin mensuel du commerce [December issues].
Ministère du Travail et de la Prévoyance Sociale. Rapport relatif à l'exécution de la loi sur la réparation des dommages résultant des accidents du travail. Revue du travail.
Office Central de Statistique. Annuaire statistique. Bulletin de statistique. Statistique des accidents de roulage et de la circulation.
 Bulletin de l'Institut de Recherches Économiques.

Brazil—

Directoria de Estatística Economica e Financeira. Banking. Estatísticas economicas. Foreign trade of Brazil, summary by merchandise. Rivista de economica e estatística. Movimento marítimo. Quadros estatísticos.
Instituto Nacional de Estatística. Anuario estatístico do Brasil.
Ministério da Agricultura. Revista de economia e estatística.
Ministério de Trabalho Industria e Commercio. Boletim.

Bulgaria—

Direction Générale de la Statistique. Annuaire statistique. Bulletin mensuel de statistique. Revue de la statistique générale. Statistique agricole. Statistique du commerce extérieur. Statistique co-opérative. Statistique criminelle. Statistique de l'enseignement. Statistique du mouvement de la population.
 State University of Sofia. Publications of the Statistical Institute for Economic Research.

Chile—

Dirección General de Estadística. Estadística Chilena [monthly].

China—

Chinese Maritime Customs. List of lighthouses, light-vessels, etc. Monthly returns of the foreign trade. Trade of China [annual].
National Tariff Commission. Annual report of Shanghai commodity prices. Index numbers of wholesale prices.
Ministry of Communications. Report on the Chinese Post Office.

(c) Foreign Countries—Contd.

Czechoslovakia—

Office de Statistique. Annuaire statistique. Monthly summary of foreign trade. Rapports de l'Office de Statistique. Rapports sur les prix. Revue statistique Tchécoslovaque.

Statistique Tchécoslovaque [including annual returns on—agriculture, education, movement of population, public finance, trade, etc.].

PRAGUE. Annuaire statistique. Bulletin mensuel.

Denmark—

Det Statistiske Departement. Danmarks Handelsflaade og Skibsfart. Danmarks Vareindførsel og -Udførsel. Statistisk Aarbog. Statistiske Efterretninger.

Statistiske Meddelelser [including annual returns on—agriculture and live-stock, electrical undertakings, housing and rents, Municipal finance, prices, production, taxation, etc.].

Vareomsætningen med Udlandet [monthly].

COPENHAGEN. *Statistiske Kontor.* Statistisk Aarbog for København, Frederiksborg og Gjentofte Kommune.

Sundhælsvæsenet, Aarsberetning.

Bulletin hebdomadaire de statistique démographique.

Nationaløkonomisk Tidsskrift.

Egypt—

Département de la Statistique Générale. Annuaire statistique. Annual statement of the foreign trade. Monthly bulletin of agricultural and economic statistics. Monthly summary of the foreign trade. Return of shipping, cargo, and passenger traffic in the Egyptian ports and Suez Canal transits [annual, and Quarterly]. Statistique scolaire. Vital statistics. Weekly return of births, deaths and infectious diseases.

Commission de la Dette Publique. Compte rendu des travaux de la Commission.

Ministry of Communications. Report of the postal savings bank service. L'Egypte contemporaine.

Estonia—

Bureau Central de Statistique. Annuaire de la statistique agricole. Commerce extérieur. Recueil mensuel du Bureau Central de Statistique.

Eesti Pank: Annual report. Estonian economic year-book.

Institute of Economic Research: Konjunktuur [monthly]. Majandusteated [weekly].

Finland—

Bureau Central de Statistique. Annuaire statistique.

Finlands Officiella Statistik [annual returns relating to: banks; crime; elections; industries; savings banks; trade; vital statistics].

Ministère des Affaires Sociales. Revue sociale.

Acta Academiae Aboensis, Mathematica et Physica.

France—

Administration des Monnaies et Médailles. Rapport au Ministre des Finances. Banque de France. Compte rendu des opérations.

Direction Générale des Douanes. Statistique mensuelle du commerce extérieur. Tableau général du commerce extérieur. Tableau général de la navigation maritime.

Ministère de l'Agriculture. Statistique agricole.

Ministère des Colonies. Bulletin mensuel de statistiques coloniales.

Ministère des Finances. Bulletin de statistique et de législation comparée.

(c) Foreign Countries—Contd.

France—Contd.

Ministère de la Justice. Compte générale de l'administration de la justice criminelle.

Ministère du Travail. Bulletin du travail.

Statistique Générale. Annuaire statistique. Bulletin de la Statistique Générale [quarterly]. Supplément mensuel. Statistique annuelle des institutions d'assistance. Statistique du mouvement de la population.

Ministère des Travaux Publics. Statistique de la navigation intérieure. Statistique de la production et de la distribution de l'énergie électrique. Statistique de l'industrie minérale. Statistique des chemins de fer (Intérêt général).

PARIS. *Bureau de la Statistique Municipale.* Annuaire statistique.

Annuaire statistique de l'Afrique occidentale.

Index generalis: the year-book of the universities.

Journal de la Société de Statistique de Paris.

Journal des économistes.

Revue économique et financière.

Revue d'économie politique.

Revue française d'outre-mer.

Travaux de l'Institut de Science Financière et d'Assurances Université de Lyon.

Germany—

Reichsarbeitsministerium. Reichsarbeitsblatt.

Reichsgesundheitsamt. Reichs-Gesundheitsblatt.

Statistisches Reichsamt. Der Aussenhandel Deutschlands.

Statistik des Deutschen Reichs [including annual reports on—Consumption of excisable articles, Crime, Movement of Population, Railway traffic (goods), Sickness insurance, Trade and Navigation, etc.].

Statistisches Jahrbuch für das Deutsche Reich. Vierteljahrshefte zur Statistik. Wirtschaft und Statistik.

BADEN. *Statistisches Landesamt.* Statistisches Jahrbuch für das Land Baden.

BAVARIA. *Statistisches Landesamt.* Statistisches Jahrbuch für Bayern.

BERLIN. *Statistisches Amt.* Berlin in Zahlen. Monatsbericht.

SAXONY. Zeitschrift des Sächsischen Statistischen Landesamts.

Allgemeines Statistisches Archiv.

Archiv für mathematische Wirtschafts und Sozialforschung.

Bulletin of the Hamburg Worlds Economics Archives.

Die Bank.

Deutsche Volkswirt.

Institut für Konjunkturforschung: Halbjahrsberichte zur Wirtschaftslage,

Statistik des In- und Auslands. Vierteljahrsheft zur Wirtschaftsforschung.

Weekly Report, Wochenbericht.

Weltwirtschaftliches Archiv.

Wirtschaftsdienst.

Zeitschrift für die gesamte Versicherungs-Wissenschaft.

Greece—

Statistique Générale. Annuaire statistique. Bulletin mensuel de statistique.

Bulletin mensuel du commerce. Statistique du commerce.

Commission Financière Internationale. Compte rendu des opérations.

Hungary—

Office Central Royal Hongrois de Statistique. Annuaire statistique hongrois.

Bulletin statistique trimestriel.

Publications statistiques hongroises [including annual reports on—education, movement of population, trade, etc.].

Revue hongroise de statistique.

(c) Foreign Countries—Contd.

Hungary—Contd.

BUDAPEST. *Kommunalstatistisches Amt*. Monatshefte. Statistisch-Administratives Jahrbuch.

Journal de la Société Hongroise de Statistique.

Matematikai és fizikai lapok.

Iceland—

Bureau de Statistique. Statistical bulletin. Statistique de l'Islands [including annual reports on agriculture, fisheries, trade, etc.].

Italy—

Istituto Centrale di Statistica. Annali di statistica. Annuario statistico italiano. Bollettino mensile di statistica. Bollettino mensile di statistica agraria e forestale. Compendio statistico italiano. Movimento della popolazione. Statistica delle cause di morte. Statistiche intellettuali.

Ministero dell'Agricoltura e delle Foreste. Annali della sperimentazione agraria.

Annali dell'Istituto di Statistica.

Annali di economia.

Assicurazioni sociali.

Economia.

Giornale degli economisti.

Giornale di matematica finanziaria.

Metron.

Organizzazione industriale.

Prospettive economiche. (G. Mortara.)

Rivista di storia economica.

Supplemento statistico.

Japan—

Bureau de la Statistique Générale. Mouvement de la population. Résumé statistique de l'Empire du Japon.

Department of Finance. Financial and economic annual of Japan.

Ministry of Agriculture and Forestry. Statistical abstract.

TOKYO. Statistical abstract.

Kyoto University. Economic review.

Nippon Life Assurance Co. Annual report and statement of accounts.

Oriental economist.

Report on progress in Manchuria.

Latvia —

Bureau de statistique. Bulletin mensuel. Commerce extérieur.

RIGA. Annuaire statistique de la ville.

Luxemburg, Grand Duchy—

Office de Statistique. Aperçu Statistique. Publikationen des Statistischen Amts. Bulletin trimestriel.

Mexico—

Departamento de la Estadística Nacional. Revista de economía y estadística.

Morocco—

Bulletin économique de Maroc.

Mozambique—

Repertação de Estatística. Anuario estatístico. Bulletin économique et statistique. Estatística do comércio e navegação.

(c) Foreign Countries—Contd.

Netherlands—

Centraal Bureau voor de Statistiek. Crimineele statistiek, Gevangenisstatistiek, Statistiek van de toepassing der kinderwetten. Jaarcijfers voor Nederland. Jaarstatistiek van den in-, uit- en doorvoer. Justitieele statistiek en Faillissementsstatistiek. Maandstatistiek van den in-, uit-, en doorvoer. Nederlandsche Conjunctuur. Maandschrift van het Centraal Bureau voor de Statistiek. Statistiek van de samenstelling der Nederlandsche koopvaardijvloot en van de scheepsrampen.

Central Commissie voor de Statistiek. Jaarverslag.

AMSTERDAM. *Bureau de Statistique.* Annuaire statistique. Bulletin mensuel.

Netherlands East Indies—

Centraal Kantoor voor de Statistiek. Statistics of education. Statistical abstract. The export crops.

Norway—

Committee for Whaling Statistics. International whaling statistics.

Det Statistiske Sentralbyrå. Månedsopgaver over vareomsætningen med utlandet.

Norges Offisielle Statistikk [including annual reports on—agriculture and live-stock, assurance, crime, finance, fisheries, industrial production, mineral industry, milk industry, postal and telegraph services, public health, railways, trade, veterinary service, etc.].

Statistisk årbok. Statistisk økonomisk oversikt. Statistiske meddelelser. OSLO. Årsberetning. Beretning fra Oslo helseråd. Statistisk årbog. Statistisk månedsskrift.

Peru—

Departamento de Estadística General de Aduanas. Anuario del comercio exterior.

Dirección Nacional de Estadística. Extracto estadística.

Banco Central de Reserva, boletín. Memoria.

Philippine Islands—

The Philippines statistical review.

Poland—

Office de Statistique. Commerce extérieur [monthly].

Concise statistical year-book. Informations statistiques.

Statistique de la Pologne [including annual returns relating to—agriculture, education, industry, postal service, prices, trade, etc.].

Statistique du travail.

Baltic Countries. Ekonomista.

Polish Institute for Economic Research: Konjunktura gospodareza. Monthly statistical tables.

Polish Statistical Society, Przegląd statystyczny.

Portugal—

Instituto Nacional de Estatística. Anuario estatístico. Boletim mensal. comércio externo.

Rumania—

Caisse Autonome des Monopoles. Bulletin.

Institut Central de Statistique. Anuarul statistic al României.

Ministère des Finances. Comerțul exterior al României.

(c) Foreign Countries—Contd.

Siam—

Central Service of Statistics. Statistical year-book.

Sweden—

Kommerskollegium. Kommersiella meddelanden. Sveriges in-och utförsel.

Riksgäldskontoret. Svenska statens tillgångar och schulder.

Socialstyrelsen. Sociala meddelanden.

Statistiska Centralbyrån. Statistisk årsbok. Statistiska meddelanden [including Järnvägssstatistiska meddelanden. Uppgifter om bankerna].

Sveriges officiella statistik [including annual returns relating to—agriculture and live-stock, assurance, banking, co-operative societies, crime, excise, finance (state and municipal), fisheries, forests, industry, labour and wages, lunacy, mines, pensions, poor relief, population, postal services, public health, health of army and navy, railways, savings banks, trade and shipping, veterinary service, water-power, etc.].

Sveriges Riksbank. Årsbok.

STOCKHOLM. *Statistiska Kontor.* Statistisk årsbok.

Economisk tidskrift.

Skandinaviska Banken, Quarterly review.

Svenska Handelshanken : Annual report, Index.

Swedish economic review.

Switzerland—

Banque Nationale Suisse, bulletin mensuel.

Bureau Fédéral des Assurances. Les entreprises d'assurances privées.

Bureau Fédéral de Statistique. Annuaire statistique. Contributions à la statistique Suisse.

Statistiques de la Suisse [including annual returns relating to : agricultural statistics, assurance societies, crime, finance, forestry, live-stock, vital statistics].

Département Fédéral de l'Economie Publique. La vie économique. Die Volkswirtschaft.

Direction Générale des Douanes Fédérales. Statistique annuelle du commerce extérieur. Statistique mensuelle du commerce extérieur. Statistique du commerce Suisse, rapport annuel.

BASEL-STADT. Statistisches Jahrbuch des Kantons Basel-Stadt.

BERN. Bevölkerung und Wirtschaft der Stadt Bern.

ZÜRICH. Statistisches Jahrbuch der Stadt Zurich. Zürcher statistische Nachrichten.

Journal de statistique et revue économique suisse.

Société de Banque Suisse, Bulletin mensuel.

Union suisse de Commerce et de l'Industrie, Rapport sur le commerce et l'industrie de la Suisse.

Turkey—

Office Central de Statistique. Annuaire statistique.

U.S.S.R.—

Administration Centrale de Statistique. Социалистическое Странительство СССР: Статистический Ежегодник. Плановое Хозяйство.

United States—

Agriculture, Department of. Agricultural statistics. Crops and markets. Year-book.

Central Statistical Board. Annual report.

(c) Foreign Countries—Contd.

United States—Contd.

- Census, Bureau of the.* Birth, stillbirth and infant mortality statistics. Cotton production. Cotton production and distribution. Financial statistics of cities. Monthly vital statistics bulletin. Mortality statistics. Statistical abstract of the U.S. Vital statistics—special reports.
- Children's Bureau.* Annual reports. Bulletins. The child.
- Currency, Comptroller of the.* Annual report.
- Education, Office of.* Biennial survey of education. Bulletin. School life.
- Federal Reserve Board.* Annual report. Federal Reserve bulletin.
- Foreign and Domestic Commerce, Bureau of.* Balance of international payments of the U.S. Commerce reports [weekly]. Foreign commerce and navigation for the calendar year. Monthly summary of the foreign commerce of the United States. Survey of current business.
- Federal Trade Commission.* Annual report.
- Internal Revenue, Bureau of.* Annual report of the Commissioner. Statistics of income.
- Interstate Commerce Commission.* Statistics of railways in the United States.
- Labor, Department of.* Annual report of Secretary of Labor.
- Labor Statistics Bureau.* Monthly labor review.
- Library of Congress.* Annual report of the Librarian.
- Mines, Bureau of.* Minerals year-book.
- Navigation, Bureau of.* Merchant marine statistics.
- Panama Canal, Office of the.* Annual report of the Governor. Panama Canal record.
- Public Health Service.* Public health reports.
- Tariff Commission.* Annual report.
- Treasury.* Annual report of the Secretary of the Treasury on the state of the finances. Annual report of the Director of the Mint.
- Women's Bureau.* Bulletin.
- CALIFORNIA. Division of Fish and Game. Fish bulletins.
- CONNECTICUT. Registration report. Report of State Department of Health. Health bulletin.
- MARYLAND. Annual report of State Board of Health.
- NEW YORK STATE. *Department of Labor.* Industrial bulletin.
- State Department of Health.* Annual report. Vol. 2, Division of vital statistics. Monthly vital statistics review.
- State Tax Commission.* Annual report.
- NEW YORK CITY. New York Public Library, bulletin.
- Actuarial Society of America, Transactions. American Academy of Political and Social Science, annals. American Bureau of Metal Statistics, year-book. American economic review. American Institute of Actuaries: The record, year-book. American Petroleum Institute, statistical bulletin. American Philosophical Society: Memoirs, Proceedings, Transactions, Year book. American Statistical Association, bulletin, journal. Annals of mathematical statistics.
- Carnegie Endowment for International Peace, Year book.
- Chicago Board of Trade, Annual report.
- Econometrica.
- Harvard business review. Harvard University: Review of economic statistics.
- Illinois University Bureau of Business Research, bulletins. International conciliation.
- Johns Hopkins University School of Hygiene, Collected papers from the Department of Biology. Journal of political economy.
- Milbank Memorial Fund: Annual report, Collected papers on research, Quarterly bulletin. Mineral industry.
- Quarterly journal of economics.
- Smithsonian Institution: Annual report, Publications. Social research.
- Stanford University Food Research Institute, wheat studies.

(c) Foreign Countries—*Contd.***Uruguay—**

Contaduría General de la Nación. Boletín de hacienda.
Dirección General de Estadística. Anuario estadístico. Síntesis estadística.

Yugoslavia—

Statistique Générale d'État. Annuaire statistique.

(d) International.

Bank for International Settlements —

Annual report.

International Institute of Agriculture -

Annaire international de législation agricole. International review of agriculture. International year-book of agricultural statistics.

International Labour Office -

International labour review. Studies and reports. Year-book of labour statistics.

International Statistical Institute

Bulletin de l'Institut International de Statistique. Revue de l'Institut International de Statistique [quarterly].

League of Nations—

Official journal.

Economic and Financial Section. Balances of payments. International trade statistics. Money and banking. Monthly bulletin of statistics. Review of world trade. Statistical year-book of the League of Nations. World economic survey. World production and prices.

Health Organization. Annual epidemiological report. Epidemiological report: statistical supplement to the weekly epidemiological record [monthly].

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